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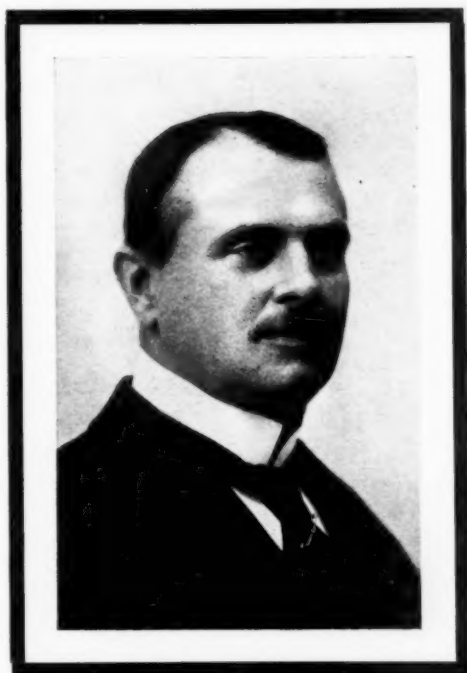
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Professor Johan Frederik Fischer

## In Memoriam

Through the early death of Professor FISCHER (53 years old) the narrow circle of Danish radiological physicians has lost one of its very best members. FISCHER was the first physician in Denmark, who occupied himself to a great extent with medical radiology. A few months after the discovery of the roentgen rays he opened a private roentgen clinic

and in 1898 he became the leader of the roentgen department of the »Københavns Kommunehospital», which position he occupied till his death. As by and by the other municipal hospitals of Copenhagen founded roentgen departments, he was made their administrative leader.

During the first years of his radiological operations he very energetically tried by numerous lectures to spread the knowledge of the roentgen rays, and during the course of years he eagerly and with great interest followed the development of the different branches of knowledge, which were by degrees made subject to radiology. As he understood the necessity of always keeping both his diagnostical and his therapeutical technics in the very highest state of perfection he most interestedly followed the great technical progress, and his great experience taught him to be a chooser who always picked out the best things and never accepted anything, simply, because it was new.

By several smaller discussions on radiological matters he manifested his scientific interest, which he also showed during later years in his work for the Scandinavian radiological co-operations. He was joint founder and editor of the »Acta radiologica», and at the meeting in 1921 of the »Nordisk Forening for medicinsk Radiologi» he took the chair; upon that occasion he was appointed honorary member of the association, an honour which he no doubt highly appreciated.

FISCHER furthermore showed his great interest in radiology by placing himself at the head of a subscription for the purpose of providing Denmark with radium, and before his death he had the satisfaction to know the matter to be so far settled, as the procuring of a sufficient quantity of radium was secured. He had also the joy of seeing that radium-therapy in Denmark was on the whole on the point of being arranged in a more satisfactory way than had hitherto been the case.

Like many of the pioneering roentgen physicians FISCHER, unfortunately, did not escape severe injuries to his hands through burns, but he bore his sufferings and great invalidity with perfect heroism, never allowing his pains to subdue his energy. His optimist way of looking at life, which he surely kept up in spite of all, helped him no doubt in this respect and was doubtless the reason of that wonderful power of encouraging his patients, which he possessed in so high a degree.

FISCHER possessed excellent representative abilities, which were of great importance to him in the varied circumstances which he met with during his life. Moreover, he was in possession of exceedingly charming qualities, perhaps displaying these at their best when moving in smaller circles, and in this respect he will be deeply missed by the little circle of Danish radiologists.

*H. J. Panner.*



## Roentgenological Examinations of the Motility of the Stomach in Healthy Individuals during Rest and Motion\*

by

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The motility of the stomach, and particularly that part which purely concerns the emptying, has been an important and very much discussed subject in the roentgen diagnosis of gastro-enterological conditions. In the beginning these examinations were made with the different retention meals followed by lavage, and later studied by the roentgenological method. Attention was early called to the question as to whether there was any difference in the motility of the sick stomach or of the healthy one, and what difference it made whether the individual was at rest, in motion, or in a right or left-sided prone position. As to this latter question the authorities have not agreed and in the following a few examples are mentioned.

KJÆRGAARD (Denmark), 1888, found that the emptying takes place quickest and easiest with patients sleeping and lying in bed,

ZIEGELROTH (Inaug. Dissert. Halle, 1902) denies, on the other hand, every influence of sleep, nearly in agreement with

FLEISHER (Berl. klin. Wochenschrift, 1892) who finds »the emptying» of the same duration, whether the individual is up or in bed; delayed, if the person examined is in motion after the meal.

v. MEERING (Therapie der Gegenwart, 1902), on the contrary, finds that the emptying takes place quickest when lying in a right-sided position or walking quickly. The emptying is somewhat slower when lying on the back, and slowest when the individual is sitting, standing, walking slowly or lying on the left side.

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\* Read at the II meeting of the Nordisk förening för medicinsk radiologi at Copenhagen, Sept. 1921.

Numerous examinations have been made by the roentgenologist, regarding the normal time it takes the stomach to empty, since this question was first raised within the science of roentgenology; however, there has been slight notice taken of the abovementioned circumstances, as the persons examined have nearly always been sitting or in slight motion.

JOLASSE (Fortschritte Bd. XI, page 47) examined the same individual after lying on the right side, on the back, and walking, but found no difference in the time of emptying.

On the other hand, MARCOWIC and PERUSSIA found that the stomach emptied itself quicker when the person examined made medium-strong movements than when resting (Reported in Med. Klinik 1910—14., a work not at my disposal).

A comparison between ambulatory patients (Dr. BORGBJERG's) and patients of the Municipal Hospital of Copenhagen was striking. The stomach of the ambulatory patient had emptied after two—three hours, while, in the patients lying in bed, even in cases where serious gastric disturbance was not discovered, retention was often found after four hours. In view of these facts an examination of this question seemed desirable. The only essential difference in the two groups was, that the firstnamed walked about or sat during the examination, the last-named lay quietly in bed.

Through Professor EHLE's kindness I succeeded in examining twenty individuals that had never presented any clinical symptoms of disturbances in the digestive organs. These patients were suffering from no other disease than a beginning syphilis, the examination being made shortly after the appearance of the primary chancre. The tests were made in such a manner that the patients were fluoroscoped immediately after taking 300 grammes of rice flour gruel + 100 gr. barium sulphate. (Our Dept. ordinary retention-meal and the same as used for Dr BORGBJERG's patients). In the first experiments the examined patients went to bed, stayed there for 2—2½ hours, got up and walked to the roentgen room. If there was any retention they returned to bed, but were examined in about half an hour (according to the amount retained) and thereafter each half hour until the stomach was empty. If it was doubtful whether a gruel shadow belonged to the stomach or intestine, the patient was given a barium tablet. This tablet could be seen in the shadow and moved with it, if the gruel was in the stomach.

In two—three days, after the intestines were entirely empty of the meal, the patient was re-examined in the same manner. However, during this period the patient was up and about.

A disturbing factor in these examinations was that the patients lying

in bed had to get out of bed, dress, walk to and from the roentgen room, undress and probably repeat this more than once. However, circumstances did not permit us to do otherwise. I am therefore of the opinion that the emptying time of the patients lying in bed is not absolutely determinative, as the difference is too small; yet they show with relative clearness in which direction the facts may be found.

Ten men and ten women were examined, the lastnamed not during the menstrual or pre-menstrual period. LÜDINS examinations (Fortschr. Bd. XXIII, page 501) have shown that during these periods there may be considerable delay in the emptying.

The table shows the following results.

#### The stomach was emptied

| Between                           | Men          |         | Women        |         |
|-----------------------------------|--------------|---------|--------------|---------|
|                                   | Lying in bed | Walking | Lying in bed | Walking |
| $2\frac{1}{2}$ —3 hours . . . . . | —            | 4       | —            | 2       |
| 3— $3\frac{1}{2}$ " . . . . .     | 7            | 5       | 1            | 3       |
| $3\frac{1}{2}$ —4 " . . . . .     | —            | 1       | 3            | 3       |
| 4— $4\frac{1}{2}$ " . . . . .     | 2            | —       | 6            | 2       |
| $4\frac{1}{2}$ —5 " . . . . .     | 1            | —       | —            | —       |

By studying the above table we find that, in 7 out of 10 men, the emptying time was shorter when walking than when lying. The difference was

|                       |
|-----------------------|
| 15 minutes in 2 cases |
| 30 " " 1 case         |
| 35 " " " "            |
| 40 " " " "            |
| 60 " " " "            |
| 180 " " " "           |

In regard to the women, there were two cases in which the emptying took place respectively 20 and 30 minutes quicker when lying than when walking. With two there was no difference; in the remaining 6 the stomach emptied quicker when walking than lying, the difference being

|                       |
|-----------------------|
| 30 minutes in 2 cases |
| 50 " " 1 case         |
| 75 " " 2 cases        |
| 125 " " 1 case        |

Taking the average difference of all the examined cases, we find that the emptying takes 37 minutes longer for the men lying in bed, and 34 minutes for the women lying in bed. A single case (a man) was examined three times, and constantly found that, when walking about, his stomach emptied half an hour quicker than when lying.

Consequently, there is a distinct difference in the emptying time. The stomach empties faster when the person examined is in motion. A difference which undoubtedly would have been greater, had it been possible to keep the individuals lying in bed, completely at rest during the entire examination.

This examination has made it clear that, in determining normal and abnormal time of emptying, we must consider whether the patient has been at rest or in motion during the examination. A retention of  $4-4\frac{1}{2}$  hours should be considered less abnormal in a patient lying than in an individual in motion.

A few words in conclusion about the supposed times of emptying.

Many writers as KAESTLE, SCHWARTZ & KREUZFUCHS, JOLASSE, GROEDEL and WULACH state that barium gruel is evacuated between  $2\frac{1}{2}-3\frac{1}{2}$  hours. STIERLIN does not always consider a 6 hours' retention to be pathologic; HAUDEK does not consider less than  $\frac{1}{4}$  of the total intake, after 6 hours, of diagnostic value.

In a later series of examinations of these circumstances WISSING found [Ugeskrift for Læger (Denmark), 1921, No. 37] that 5 hours' retention must be considered to be a motor insufficiency. Which seems to agree with the emptying times of the cases I have examined, as shown by the following table:

Out of 10 men lying in bed, the stomach in 7 had emptied within  $3\frac{1}{2}$  hours; the remaining 3 within 5 hours.

In 9 walking, the stomach emptied within  $3\frac{1}{2}$  hours, 1 in 4 hours.

In women, the stomach emptied somewhat slower than in men, a fact KAESTLE earlier pointed out, and which again is noticeable in our series of patients, at rest as well as in motion.

Out of 10 women lying in bed, the stomach emptied within  $3\frac{1}{2}$  hours in one only, within 4 hours in three and within  $4\frac{1}{2}$  hours in the remaining 6.

In motion, in five out of these same women, the stomach emptied in  $3\frac{1}{2}$  hours, five within  $4\frac{1}{2}$  hours in the remaining.

It appears, then, that, in women lying in bed, the stomach ought to empty in 5 hours. This amount of time can undoubtedly be decided upon as the normal maximum time.

### Summary

The author has examined 20 stomachs of healthy individuals — 10 men and 10 women — following the intake of an opaque meal consisting of 300 grammes of rice flour gruel and 100 grammes of barium sulphate. The individuals were partly at rest and partly in motion. He has found that

- 1) The stomach empties quicker during motion than rest.
- 2) In women, the stomach empties somewhat slower than in men, both in motion and at rest,
- 3) The stomach empties normally at rest within 5 hours' intake of opaque meal.

I wish to thank the chief of our department, Prof. J. F. FISCHER, for the great willingness with which he placed his department at my disposal; also Prof. EHLERS for permission to use patients from his department.



## The Definite Form of the Coxa Plana

by

*Henning Waldenström, M. D.*

(Tabulae XXVI—XXX)

First a few words must be said about the name coxa plana; it is relatively new. It was suggested by the author in 1920. The name refers to the most characteristic attributes of the disease, viz., that the caput, collum and acetabulum, that is to say, the entire hip-joint becomes flattened. The name is taken to be analogous with coxa vara and coxa valga, the two other big groups of deformities in the hip; and just as in the case of coxa vara, where one speaks of a coxa vara essentialis, an osteomyelitica, a tuberculotica, and so on, one can speak of a coxa plana essentialis, an osteomyelitica, a tuberculotica, etc. Without a doubt the most usual of these, and the only one which will here be described, is the coxa plana essentialis, here, for the sake of brevity, called coxa plana. In the literature the disease is called Legg's disease, maladie de Calvé, Perthes Krankheit, and so on, and osteochondritis deformans coxae juvenilis. The first names are unsuitable because they are the names of persons. The last name is incorrect for it is not a question of an inflammation.

At the beginning most of those who described the disease believed that the cause was due to some bacterial influence; Legg and Perthes believed in staphylococci and the writer believed that some benign form of tuberculosis was present. Under such circumstances the name of osteochondritis might be accounted for; but now, when it is known that the cause of coxa plana essentialis is not due to any inflammatory influence, it becomes misleading.

Can a coxa plana essentialis be differentiated from a coxa plana tuberculosa, staphylocotica, etc. with certainty on a roentgen picture during the stage of development? No, it cannot. These coxa plana of inflammatory origin are very rare, but they are nevertheless to be found. I reported in my publication of 1909 a case of certain tuberculous coxa plana which, at a certain stage, both with respect to symptoms and the

roentgen picture, could not be differentiated from the coxa plana essentialis. The development afterwards became a tuberculosis in the whole joint. I have likewise had a case of coxa plana after a rheumatic inflammation in the hip-joint under observation which, also, at a certain stage of its development, resembled exactly a coxa plana essentialis. This will be published in the *Archive franco-belge* 1922.

In order to be able to say with certainty, in a positive case of coxa plana, that it is an essentialis, a certain observation period is sometimes needed, so that the typical development can be seen, together with an anamnesis that does not suggest an inflammatory process. Nevertheless, these cases of coxa plana non essentialis are surely so rare that, in practice, one can generally make a diagnosis of a coxa plana essentialis in the stadium of its development, without needing any observation period.

LEGG and the writer were the first to describe this disease; it was in 1909. The following year it was described by SOURDAT, CALVÉ and PERTHES, in the order just given. Since this, numberless publications have dealt with this disease. I will not give any review of these works, but will simply mention a few words about that which is found in the literature respecting the final stage. No one as yet has attempted to explain the final stage; only single cases are reported where the authors believe that, from the appearance of the deformity in a certain case, they can infer a coxa plana in the final stage. Thus SINDING-LARSEN, SUNDT, LEGG, TAYLOR and FRIEDER, PERTHES, SCHWARTZ, NOVÉ-JOSSERAND, PANNER and the writer have reported such cases. Some of these cases have doubtless never been coxa plana. LEGG has divided the final stage into two groups, according to the form, viz., »cap-deformity» and »mushroom deformity». His cases, however, have not been under observation from the beginning of the disease and they, therefore, do not decide the actual, definite form. SUNDT alone, by means of after-examination of some of SINDING-LARSEN's cases, has been enabled to describe roentgenograms from a period when the development was concluded and which, therefore, must be regarded as definite.

This paper is thus intended to endeavour to clear up by demonstrated cases of coxa plana the hitherto rather obscure question as to the appearance of the definite form of coxa plana. For this it is necessary, firstly, to have observed the beginning and the development of the disease, so that every case included is, with certainty, a coxa plana essentialis; secondly, these cases must, moreover, be kept under observation for so long a period that the normal growth is concluded; and thirdly, a sufficiently large number of cases must have been under observation, so that the typical kind of all the varying forms that the coxa plana can assume may be ascertained. That this careful method of pro-



cedure is necessary, when the determination of the definite form of coxa plana is aimed at, is shown, among other things, by a case of tuberculous coxa plana represented by the roentgenograms (Fig. 10). On the first picture a typical tuberculous coxitis is seen (Fig. 10 a) with the joint atrophic, the articular cartilage thinned, and the clinical symptoms of a tuberculous coxitis. Ten years afterwards it is shown on the roentgen picture (Fig. 10 b) as a typical coxa plana, a coxa plana tuberculosa, impossible now, in the definite form, to see any tuberculous character.

Since 1907, when I observed my first case of coxa plana, I have treated and carefully roentgen-examined 37 cases of coxa plana essentialis. Five of these are double-sided, therefore the number of hip-joints is 42. Of these, 32 were boys and 5 girls.

In 22 of these hip-joints I have followed the development from the beginning until the growth was concluded. Out of these 22 there are 10 who have exceeded the age of 20 years. The form of the hip for many years has been the same. My opinion is that the definite form is reached before the conclusion of growth. It is these 22 cases which serve as a basis for the conception respecting the final form that I here advance.

Coxa plana offers interest especially from a roentgenological point of view. It not often yields symptoms that demand special treatment. Sometimes there are pains and stiffness and then it is best to prescribe rest in bed, or plaster of Paris for a longer or shorter period. But the treatment is of no real importance for the development of the disease. My cases have been treated in different ways, sometimes by rest in bed, or extension, or immobilisation bandages, etc. without the disease appearing to have been influenced in its development. It develops quite in the same typical and presumably predestined manner whatever one does. Perhaps great exertions should be forbidden (gymnastics, jumping, football, and so on.). One of my most severe cases, in respect to the extent of the deformity, was treated the whole time with rest in bed and permanent extension, and afterwards bandage. My mildest case went the whole time without treatment.

During the development of the disease the caput, collum and the acetabulum become more or less flattened and the name of coxa plana is just as characteristic at all the developmental stages of the disease as at the definite stage. In the earliest stages it is the flat epiphysis that first strikes the eye, and in the final stage it is the ordinary, extremely flattened caput and collum which characterizes the disease.

The development takes place slowly during several years and I have tried, in order to obtain more lucidity in the different phases of the development, to divide it into certain groups.

I will here go briefly through these groups. Those who are interested in the matter can find them more fully described in Vol. 55 of *Acta chirurgica Scandinavica*.

### The developmental periods of the coxa plana

#### I. *The evolutionary period* 3—4 years.

- a. The initial stage  $\frac{1}{2}$ —1 year. The epiphysis dense with decalcinated spots, flattened, uneven at the margin. The collum often with decalcinated spots just near the upper part of the epiphyseal line. The articular cartilage of normal height. Example, Fig. 4 a.
- b. The fragmentation stage 2—3 years. The epiphysis extremely flattened, divided. At the beginning it is often in three large pieces that can afterwards be divided into many small granules. Atrophy. Example, Fig 9 a, the beginning and 4 b, the end of the fragmentation.

#### II. *The healing period* 1—2 years. The epiphysis becomes homogeneous. The lime returns. (Example, Fig. 3. b.)

#### III. *The growing period* to the conclusion of the normal period of growth. During this the coxa plana assumes its final form.

#### IV. *The definite stage*.

In my paper in 1910 I described what I called the end-form, but added that I believed that a long observation period was necessary for, presumably, this end-form is subjected to further changes before it becomes definite. My few cases were then not under observation longer than to the close of the healing period or beginning of the period of growth. In this paper I can show that my then described end-form is really the definite form for most cases.

I consider that I am entitled to hold the opinion that those forms of coxa plana I here report are definite. I do so on the basis of having had them under observation for so long a period without the forms having changed. During the evolutionary stage the forms change, as we know, rather rapidly. During the healing period a change of form also takes place. In most cases the form is definite at the beginning of the period of growth, i. e. after the disease has existed 4—6 years. Thus Case 1 (Fig. 3), already in 1909 in the healing period (Fig. 3 b) and at the age of 9 years, was shown to have the same form as it now has (Fig. 3 c), i. e. during 13 years no change of form. In a delineation of the outlines both these contours appear delineated and it is seen how the lines of the caput in both cases run concentrically with each other. (see Fig. 1.)

Case 2 (Fig. 4) had attained in 1912, at an age of 12 years, the same

form it now has, i. e. for 10 years it has had the same form. The deformation is here more advanced and it seems in these cases the definite form is reached later. In Case 3 (Fig. 5) the definite form had been attained in 1914 at an age of 15 years; as will be seen, the deformation here is very severe and the picture then the same as Fig. 5 c.



Fig. 1.

I have chosen some typical roentgenograms of the different forms of the definite stage. They are to be found at the close and give, better than words, a picture of the varying appearances of the definite stage. Among them are to be found both extremes, minimal deformation (Fig. 9 b) and the most advanced deformation (Fig. 6 b). Both these extremes are different types of the final coxa plana. At the first glance one does not perhaps notice any characteristic common to them both, so different from each other do they appear; but, if one inspects them more closely, one will find an important common resemblance, the typical flattening. It looks as if the flattening had taken place through a pressure proceeding medially from above and coming into contact with a soft plastic caput and collum.

How this flattening has come about is difficult to say. The primary cause is an irregular cell proliferation in the cartilage and bone cells of the epiphysis and the collum with softening of caput and the medial part of the collum. The flattened form itself arises, I suppose, for the most part, from purely mechanical circumstances. In 1909 I sought to explain the genesis in this way, that the epiphysis and the medial portion of collum were softened, the articular cartilage was found like an envelope around the soft plastic substance and the pressure against the articular cavity flattened the caput and the immediate portion of the collum. The degree of flattening then depended on the degree and extent of the softening and the length of time that the caput and collum were, in this way, mechanically formable. It is seen how varying is the duration of time that elapses from the beginning of the flattening until its healing process starts.

In 1909 I described, moreover, how the caput can be pressed far out on the upper portion of the collum, almost up to the greater trochanter (for this case see Fig. 5 a). It seems to me as if this description should still hold good.

If one now looks at the course of Shenton's line in these cases, one will find that it generally runs normally (see, for instance, Figs. 3 & 7), and this in spite of the caput-collum being shortened. The explanation of this lies in the fact that the contour of the lower collum is more curved and the more sharply curved according as the deformation is more pronounced. This curving of the collum is not the normal one. If, on the contrary, one endeavours to reconstruct the normal contour of the lower collum, starting from the little normally progressing part of the collum nearest the greater trochanter, one finds that the Shenton's line so made runs higher up. Shenton's line, during the whole development, apparently, can run normally, in spite of the fact that the caput early becomes lower in its entirety.

The flattening is thus the typical feature of a coxa plana even in the final stage. This flattening takes place in this wise, the caput is increased in breadth both upward and downward. A delineation of the outline with the deformed hip laid on the healthy one from Case 1 (Fig. 1) serves as a guide. The caput takes a pronounced egg form in the roentgen picture, viewed from the anterior aspect with the axis of the egg at an angle of  $45^{\circ}$  against the horizontal and vertical plane. The broader pole of the egg lies downward-inward, its narrower pole upward-outward (example, see Figs. 3 c & 4 c). The one long side is the flattened curve of the caput, the other long side one must conceive as passing through the collum. The broad axis inclines more than in a normal caput and is mostly dependent upon the upper portion of the collum being exceedingly shortened. The lower portion of the collum is also shortened, but not in such a high degree. At its seat of origin the collum is normal in its thickness, but the breadth is quickly increased forward towards the caput (example, Figs. 3 c & 3 b). In some cases, the upper part of the caput lies quite close to the greater trochanter and then there is no collum to speak of above, only the seat of origin is to be seen (Fig. 4 c). The top of the caput will then lie with a large portion of the joint-surface outside of the articular cavity.

In order to get an actual picture of the appearance of the caput and the collum, I have also taken roentgenograms of my cases from a lateral view. The roentgenograms are taken in the flexion and abduction (method of LAUENSTEIN), if it has been possible. On these pictures, then, the anterior and posterior outlines of the caput and collum are distinctly seen. If a frontal picture and a lateral picture are now placed side by side and viewed simultaneously, a stereoscopic picture of the caput and collum is obtained (see Figs. 3 c & d, 4 c & d, 5 c & d). In the lateral picture the typical flattening is seen. Further, it is seen how, properly speaking, it is almost only the anterior portion of the caput

that is enlarged; not only in the breadth but also its height is considerably greater. It extends, then, down towards the linea intertrochanterica and goes beyond it sometimes (Figs. 4 c & d). In these more pronounced cases, the caput resembles, in a striking manner, a mushroom head with the collum as a mushroom foot. By these lateral pictures, moreover, an explanation is obtained as to how the top of the caput covers the trochanter major in the more pronounced cases. The caput lies, namely, in front of the trochanter and continues downward, extending forward surpassing the linea intertrochanterica. Therefore, in these advanced cases, it is not only the top of the collum which is practically wanting, but also the upper, anterior portion. The caput is therefore obliquely inserted in the collum. Its greatest extension is forward-upward, its smallest one backward-downward. Besides this, it inclines so that the centre of the periphery of the caput faces forward-upward.

On the frontal roentgen pictures a curved line is seen, in the severe cases, which passes — cutting the greater trochanter — down over the intertrochanter portion. If a frontal and a lateral picture are now viewed simultaneously, it will be found that this curved line tallies with the anterior periphery of the caput (Figs. 4 c & d)

I have previously pointed out how dissimilar the definite forms



Fig. 2.

can be in the different cases in spite of the fundamental type of flattening being common to all. (compare, for example, Fig. 9 b with Fig. 6 b). Between both these extremes we have Fig. 3 c which most resembles Fig. 9 b. My cases show, then, a serie of pictures, in different variations, between these five types which I have described. On closer inspection of my pictures there is, however, an essential difference between the types in Fig. 9 b & Fig. 3 b and the type in Fig. 4 c and the type in Figs. 6 & 7. They may be divided into *three groups*. These types may be said to be representatives of the three different groups. The two first

mentioned are somewhat more normal, so to speak. A distinct caput and a distinct collum, separated from the trochanter, are to be distinguished. Of my 22 coxa plana cases with definite form, 14 belong to this type. It is, then, the more usual. I call it the ordinary type.

In Case 2 (Fig. 4 c) there is nothing of the top of the caput to be found separated from the collum. The caput partially covers at the top and in front the greater trochanter. Nothing of the top part of the collum is to be seen. In the lateral picture (Fig. 4 d) the large anterior upper enlargement of the caput is seen. Fig. 2 shows the delineation of the normal and the deformed hips laid on each other from Fig. 4 c. Six of my cases belong to this second group.

The third embraces the most severe deformities. The caput does not lie in front of the greater trochanter. The collum is found shortened, but distinct even above. The upper pole of the caput is sharp at the margin and usually does not reach to the level of the greater trochanter (Fig. 6 b). Hereto belong 3 of the hip-joint cases (Figs. 3 c & 6 b, 7) and, presumably, Fig. 8 from a 47 years old man.

The deformed joint-surface in the caput generally has an even, sharp contour in the roentgen picture but now and then it can, as in Fig. 6 b, be uneven along the whole of its surface. The inequalities are so great that they must correspond to rather large hollows in the joint-surface. These must not, of course, be imagined to be only in the plane of the roentgen photograph but, here and there, on the whole of the joint-surface. The visible atrophic seats in the inside of the caput, which doubtless tally with hollows in other parts of the caput, favour this belief. Such are often found in arthritis deformans senilis.

In all these cases, where the deformity is distinctly pronounced, the hip-joint has more or less lost its character of ball-joint, with the possibility of movement in all directions. Often some direction of movement is wanting, e. g. abduction, and in the advanced cases, e. g. Figs. 5 d, 6 b & 7, the caput is like a conical plug, articulating with a similarly reformed articular cavity. The movement can then only take place in one plane, more immediately like the articulation of the mandible. The caput is, in its new form, too broad for the articular cavity. This reforms itself, certainly, as far as it can to suit the new form of the caput, but the greater or lesser portion of caput will lie outside of the articular cavity round about, but mostly above and in front. In the severe cases this part of the joint-surface never participates in the articulation; abduction is not possible. — Here above free bodies can be formed quite as in arthritis deformans. I have seen this in one case (Fig. 6 b). In one case I have seen an osteophyte from the acetabulum.

In spite of these considerable deformities in the hip-joint, the individual's capacity for motility is remarkably little reduced. One of my patients, Case 4, (Fig. 6 & 7) with both hip-joints maximally deformed, and where the motility only consisted in flexion, could play football, cycle and dance.



If this final form is that which afterwards lasts until life ends is more than I can say. Here again a long period of observation is needed, made in the way I have prescribed.

It appears to me likely that the forms I have described are definite in so far as they continue as long as the body is free from all regressive changes. Thus I should imagine that this form is permanent up to the age of 50. But my cases cannot give any proof of this before a quarter of a century.

It may be conceived from the fact that a part of the joint-surface of the caput never participates in the articulation that it may give rise to secondary deformations of the same nature as those found in arthritis deformans. I have had the opportunity of observing a few cases where the persons in question, men of about 50 years of age, came to me complaining of trouble from the hip: limping, aching, stiffness, and so on. (Fig. 8). They declared that the trouble had recently begun and did not know of any previous disease in the hip. On radiography I found in these cases a striking likeness to a severe case of coxa plana, although the deformation respecting the flattening of the caput had gone still further. The subjective symptoms in these cases have not been observed until, with the regressive changes in the hip-joint, the trouble forces them to go to the doctor. The examination yields the diagnosis arthritis deformans coxae, perhaps also senilis, but the considerable changes on the roentgen picture can impossibly have occurred in the short time the trouble has been felt, but rather it has existed long before. It is also possible that these cases have had a now-forgotten coxa plana in childhood that has not given any trouble before, when secondary changes of age begin, chiefly affecting, as is natural, a previously defective part of the body. In such cases where the changes in the joint are severe and resemble coxa plana, and the symptoms have not existed long, one can, with the greatest probability, make the diagnosis of coxa plana.

Roentgen pictures, resembling the final stage of coxa plana, may also result through a senile softening process just as they may be dependent on tuberculosis in childhood (Fig. 10 a, b) or a sustained septic infection, which soften the caput and collum.

The more pronounced the deformation becomes, the longer is the age period postponed when the definite stage can be reckoned on. The usual types, as in Figs. 3 & 9, attain their definite form during the close of the healing period and the beginning of the period of growth, the second group during the first part of the growing period, and the third group, the most severe, in the latter part of the growing period.

Cannot the definite type be prognosticated during the evolutionary stage,



or at least cannot one say to which group it will belong? In some it is impossible. If decalcinated areas have appeared in the collum and if the epiphysis in the fragmentation stage is separated into small granules and extremely flattened, if, further, a part of the epiphysis lies outside of the articular cavity at the top of the collum and if, further, the upper part of the collum is extremely shortened, then, the definite form will belong to one of the two last groups. One can also be sure that those cases, where the epiphysis has been very little fragmented, dense with decalcinated spots, although it can be considerably flattened and uneven at the edge, will belong to the first group of the definite type.

### Summary

The diagnosis coxa plana essentialis can with certainty be made only during the evolutionary stage. The definite form can therefore only be studied in cases that are followed from the beginning of the disease.

To endeavour to explain the definite form of coxa plana I have after-examined those cases of coxa plana where I have been enabled to follow the development from the beginning until the end of the period of growth. There are shown to have been 22 hips; 10 of these have even attained an age of over 20 years.

The definite form, that I can hereby establish, is shown to be very variable in respect to the degree of the deformity, but the flattening of the caput, collum and acetabulum is common to all.

Through roentgenograms, both from a frontal and lateral view, one can obtain a plastic picture of the form of the caput and collum in the different cases. It can then be seen how it is mainly the anterior-superior portion of the caput that is enlarged and that this portion, in the more pronounced cases, lies outside of the articulation. With respect to the degree of the deformity, I have divided *the definite coxa plana into three groups*.

1. The caput preserves a rounded form. The caput and the collum can be well distinguished from each other and from the trochanter. (Ex., Figs. 3 d & 9 b).

2. The upper and frontal part of the enlarged caput lies close to the greater trochanter. This portion of the caput is seen in the lateral picture, greatly enlarged, lying outside of the articulation. The upper part of the collum is not seen. (Ex., Fig. 4 d).

3. The joint-surface of the caput is uneven and more or less excavated. The upper pole of the caput is edgeformed and usually lower than the summit of the greater trochanter (Ex., Figs. 5 d, 6 b & 7).

## Descriptions of the Figures

*Case 1.* Gustaf C. Fig. 3. Tabula XXVI. On admittance to the hospital in 1907, 8 years old, he had limped for 8 months. Fig. 3 a, from 1907, shows beginning fragmentation and decalcinated spots in the collum. Fig. 3 b, from 1909, shows beginning healing. The definite form had been attained. (Comp. Fig. 1). Fig. 3 c, from 1922, at 22 years of age, shows the definite stage from an anterior view and Fig. 3 d, from a lateral view. (In Lauenstein's position).

*Case 2.* Harald K. Fig. 4. Tabula XXVII. On admittance to the hospital in 1907, 7 years old, he had limped for 6 months. Fig. 4 a shows the initial stage in 1907. Decalcinated spots in the collum. Fig. 4 b, from 1908, shows the most severe degree of fragmentation. Fig. 4 c, from 1922, at 22 years of age, shows the definite stage from the frontal view and Fig. 4 d, from the lateral view (Lauenstein's position).

*Case 3.* Erik A. Fig. 5. Tabula XXVIII. On admittance to the hospital in 1908, 13 years of age, he had had trouble for several years. — Fig. 5 a shows, in 1908, the transition from the fragmentation stage to the healing stage. Fig. 5 b, from 1911, shows how the form is on the way to become the definite one. Fig. 5 c, from 1922, at 28 years of age shows the definite stage from the frontal and Fig. 5, from the lateral view.

*Case 4.* Axel P. Figs. 6 & 7. Tabula XXIX. On admittance to the hospital in 1908, 8 years old, he had limped for 12 months. Fig. 6 a, from 1908, shows the fragmentation stage of the right hip with beginning pressing out of the caput outside of the articular cavity. Left hip normal. In 1910 he began to feel pain also in the left hip. Fig. 6 b shows, from 1922, the right hip at the age of 23 years. Observe the large concavities in the caput. Fig. 7 shows the left hip in 1922.

*Case 5.* Klas T. Fig. 8. Tabula XXIX. On admittance to the hospital he was 47 years old. Had limped for some years; pains had now started. Fig. 8 shows his roentgen picture — extreme deformation of the third type. I consider this to be a coxa plana essentialis.

*Case 6.* Folke A. Fig. 9. Tabula XXX. On admittance to the hospital in 1913, at 5 years of age, he had limped for 6 months. Fig. 9, from 1913, shows a beginning fragmentation; Fig. 9 b shows deformation that is very insignificant — only a slight flattening. The growth is certainly not at an end, but slight deformations become definite early.

*Case 7.* Harry S. Fig. 10. Tabula XXX. On admittance to the hospital in 1910, at the age of 8 years, he had a typical coxitis. Fig. 10 shows his picture on admittance: strong atrophy of the joint, the cartilage thinned. This atrophy afterwards progressed and the disease developed as a typical coxitis: lay over one year in extension. When he was now, in 1922, after-examined he showed (Fig. 10 b) a picture that is a coxa plana; it cannot be distinguished from a coxa plana essentialis at this stage. It is therefore a coxa plana tuberculosa. If the pictures 10 b and 10 c are more closely inspected, certain differences between this and a coxa plana essentialis can, however, be seen. Thus with this one the caput itself is enlarged in superior and anterior direction, bulging out towards the trochanter; even in this coxa plana tuberculosa a similar enlargement can be seen, but on closer inspection there is a distinct boundary between the caput and this enlargement which does not, then, belong to the caput.



Fig. 3 a



Fig. 3 b



Fig. 3 c



Fig. 3 d





Fig. 4 a.

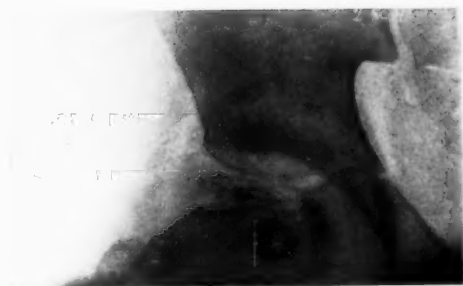


Fig. 4 b.



Fig. 4 c.



Fig. 4 d.





Fig. 5 a



Fig. 5 b



Fig. 5 c

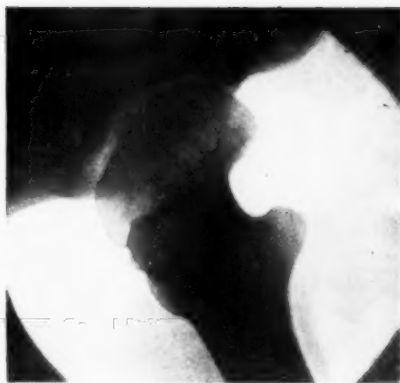


Fig. 5 d





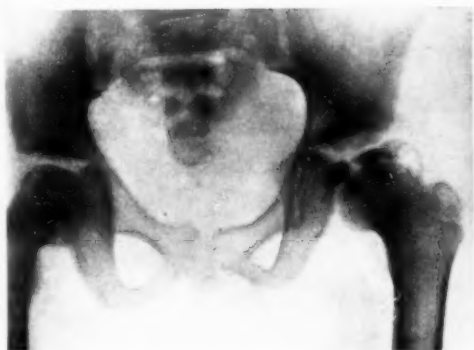


Fig. 6 a

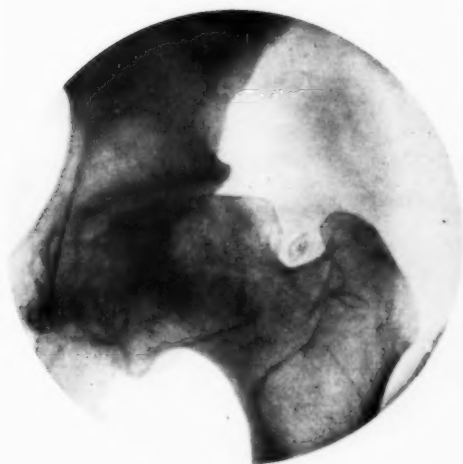


Fig. 6 b



Fig. 7



Fig. 8





Fig. 9 a



Fig. 9 b



Fig 10 a



Fig. 10 b

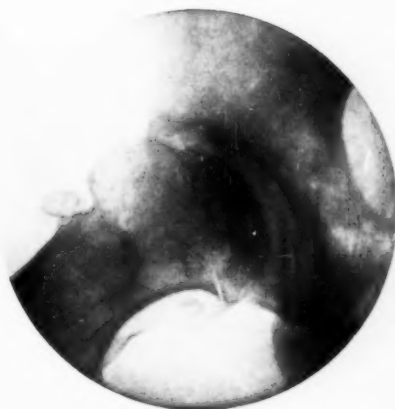
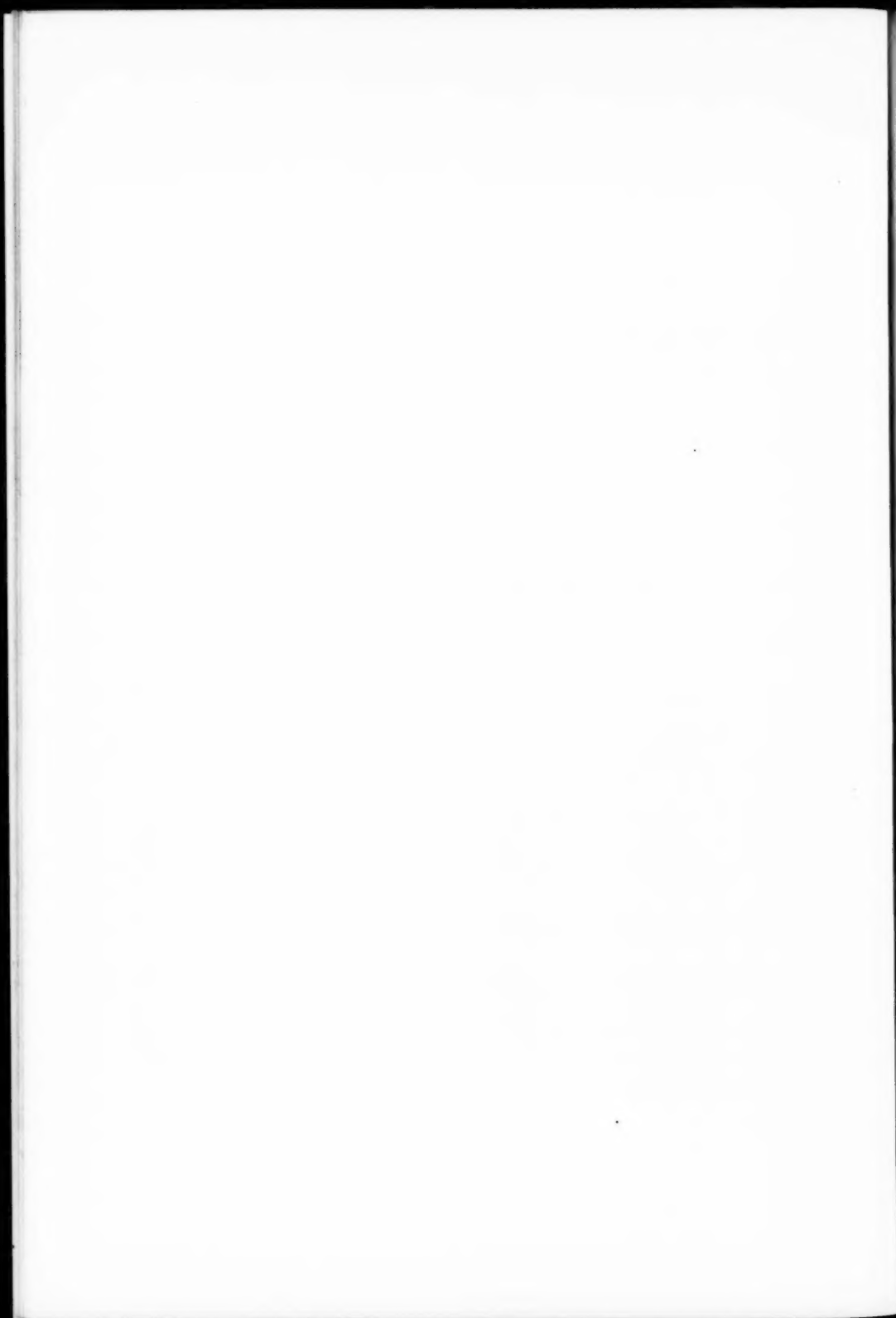


Fig. 10 c



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## A Study on the Roentgen Aspect of Tuberculosis of the Joints and its Relation to the Clinical Aspect, especially when under Treatment by Universal Light Baths

by

*Edvard Collin*

Works on this subject are only to be found scattered through surgical text-books and review articles. Nowhere have I found any attempt to render a collective description of the course of tuberculosis of the joints, notably not of its roentgenological relationship, and especially not when under treatment by universal light.

In Svenska Läkaresällskapets Handlingar, vol. 42, 1916, and in Archives of Radiology and Electrotherapy vol. 25, 1921, Professor GÖSTA FORSSELL has published a series of roentgen pictures of jointtuberculosis in order to show the variety of changes which are regarded as typical.

In his book »La cure de soleil» ROLLIER mentions the roentgen aspect of tuberculosis of the bones before and after sunlight treatment, but has not followed the intermediate stages of its development.

JOHS. IPSEN, in his work »Importance of roentgen examination for the diagnosis of tuberculosis of bones and joints», 1916, has carried out an examination of the relationship between the clinical, roentgenological, and operative findings in tuberculosis of the joint. The subject, then, is not identical with mine, but the works touch, and the large material which IPSEN, on the encouragement of Prof. ROVSING, presents (from C. Division of Rigshospitalet) is very instructive when judging the roentgen plates with tuberculosis of the bones. I shall not further enter upon a discussion of IPSEN's work, and would only say that, amongst other things, he fails to give us »a collective description of the changes in the roentgen plates peculiar to tuberculosis», just as in his material the initial stages are lacking. The present work may,

I think, amongst other things, contribute towards the remedy of this deficiency, even if it is far from satisfactory in its present form.

KISCH, in his book, »Diagnostik und Therapie der Knochen und Gelenktuberkulose«, 1921, gives a series of views which are to a certain extent to the same effect as the present material, but the therapeutics employed by him are different, namely, Bier's stase treatment with oxygen acetylene source of light, which also seems to give good results.

At the Finsen Institute there is a plentiful opportunity of following these forms of tuberculosis, and during the last few years we have begun systematically to follow the patients roentgenologically, with 3 months' interval so far as possible, as a clinical examination takes place simultaneously with the roentgen examination. In this manner one succeeds in getting a »good aspect of the osteological development and healing of tuberculosis under predominant conservative treatment. At the same time one gets — as planned in this work — an idea of the relation between the clinical and the osteological development.

I regard this work, as, if anything, an experiment. During the 2 years when I have had charge of the roentgen examination of surgical patients, I have noted, amongst other things, the series of examinations which showed *typical* aspects of tuberculosis, but as the period at my disposal has been only a short one, the material is deficient, especially as regards the affections which require longer treatment (coxitis and spondylitis, for example). On the other hand there is a rich material of hand, foot, and elbow affections, of which I have made a selection which finely demonstrates these localizations. I have chosen series which I consider typical as regards the clinical as well as the roentgenological aspect, and let them run parallel. After each series with its history a summary follows, which is a conclusion of what the history in question shows. The clinical examinations have been carried out by Doctor ERNST who, as the Finsen Institute's surgeon, has conducted the treatment of surgical tuberculosis at the clinic for skin diseases.

On account of the expense of producing the illustrated material and for lack of space I have limited the picture series to comprising the initial stage 1—4, the intermediate stages, and the final stage. Moreover, I have been obliged to cut out entirely some of the picture series, but have retained the clinical and roentgenological descriptions of the histories, and the conclusions.



## Histories with Conclusions

No. 1. 1. Patient No. 5426, M. P. Aged 3 years. Boy (Figs. 1—4).

*Arthr. tub. genus sin.*

*Clinic.*  $23/7$  19. During the last few days patient complained of pain above *left knee*. Doubtful swelling on medial side. No impact. Flexion free, extension to  $170^\circ$ . Sensitiveness to palpation. Moderate swelling of capsule.

$29/7$ . Very weak, cries at least touch of knee. Will not stand on leg. Rp. Plaster of Paris bandage.

*Roentgen.*  $29/7$  19. Medial joint-corner of condylus med. femoris destroyed. Indistinctly defined. Also distinct capsular swelling.

*Clinic.*  $9/1$  20. Very considerable swelling of capsule of *left knee*. Almost no tenderness here. No impact of patella. Motility  $90^\circ-180^\circ$ .

*Roentgen.*  $10/1$  20. Destruction on epicondylus med. femoris has propagated considerably, as nearly entire half of epiphysis is destroyed. Joint-fissure not distinctly contracted.

*Clinic.*  $21/4$  20. Some swelling below patella. Infiltration of capsule well diminished. Motility  $180^\circ-150^\circ$ . Active. (New plaster of Paris bandage).

*Roentgen.*  $21/6$  20. Distinct healing of process in Condyl. med. with new formation of bone, and distinct definition of focus.

*Clinic.*  $5/4$  21. No complaints. Position of knee good. No swelling of capsule. No tenderness. Motility  $180^\circ-110^\circ$ .

*Roentgen.*  $5/4$  21. Considerably improved bone structure. New formation of condylus med., contours still somewhat irregular.

*Treatment.* Universal quicksilver — quartz light, plaster of Paris bandages.

**Conclusion.** 1) A tuberculous affection often propagates — especially seen roentgenologically — during the beginning of the light-bath treatment, and latent foci manifest themselves in order to heal after this »period of re-action«. 2) The roentgenological improvement reveals itself in a distinctly defined focus, and by new formation of bone in the surroundings.

No. 2. Patient No. 7435, L. H. Aged 1 year, Girl. (Figs. 5 6, 7).

*Ostitis tub. ulnae sin.*

*Clinic.*  $21/10$  20. During the last few months inspissation of proximal  $1/3$  of *left fore-arm*, and tenderness here. Swelling observed localized to ulna and fleshy parts. Circumference  $+1.3$  cm. Elbow-joint free apart from restricted rotation. Fluctuation below olecranon.

*Roentgen.*  $21/10$  20. *Left elbow*, considerable periosteal stratification on ulna. Structure obscure and irregular. Process comprises proximal  $1/3$  of ulna as far as nucleus of olecranon.

*Clinic.*  $4/2$  21. Slight secretion from fistulas (after incision  $20/11$ ). Some increase in thickness round ulna. Free motility.

*Roentgen.*  $9/2$  21. Improved structure. Boundary between original contour of ulna and the periostitis almost gone. Commencing structure formation in the latter.

*Clinic.*  $29/6$  21. Arm reliable. Somewhat restricted rotation. Fistulas firmly closed. No swelling or tenderness.

*Roentgen.*  $21/8$  21. Structure completely natural. Only slight indication of periostitis visible on the dorsal side.

*Treatment.* Universal quicksilver — quartz light. Incision.

**Conclusion.** A considerable ostitis (ulnæ) can heal without a trace, and with complete restitutio ad integrum (roentgenologically and clinically).

No. 3. Patient 3395. K. S. Aged 2 years. Boy (Figs. 8, 9).

*Spina ventosa digiti IV manus d.*

*Clinic.*  $13/5$  19. Considerable swelling of *right hand*, corresponding to metacarpus II. Unquestionable spina ventosa of base of 4<sup>th</sup> finger. Doubtful spina ventosa of base of 2<sup>nd</sup> and 3<sup>rd</sup> fingers, and also of metacarp. IV.

*Roentgen.*  $13/5$  19. *Right hand.* Metacarp. II and IV, and phalanx I of 4<sup>th</sup> finger seen to be seat of typical spina ventosa in 3 different stages (central destruction, periosteal stratification, and obliteration of structure, and immense thickening of the bone). Incipient ostitis in Metacarp. V is also seen, but no osseous changes at base of 2<sup>nd</sup> and 3<sup>rd</sup> fingers.

*Clinic.*  $23/4$  20. Nothing to remark in *right hand*.

*Roentgen.*  $23/4$  20. Nothing abnormal whatever is seen in *right hand*, especially not in previously affected bones, the structure of which is now completely normal.

*Treatment.* Universal quicksilver — quartz light.

**Conclusion.** 1) On the same hand there may be found all stages of spina ventosa, from commencing obliteration of structure through great destruction and periostitis to complete healing. 2) Spina ventosa at times shows itself earlier roentgenologically than clinically. 3) Spina ventosa with excessive destruction can heal up without a trace.

No. 4. Patient 3732. T. E. Aged 10 years. Boy (No Fig.)

*Spina ventosa metacarp. III, IV, V, manus d. fist.*

*Clinic.*  $1/5$  18. During 8 years »boils» on *right hand*. Treated operatively, constant relapse. Considerable swelling of back of hand with 2 loose ulcerations about the size of a 3-penny piece with thickening of metacarp. IV and V is seen.

*Roentgen.*  $6/5$  18. *Right hand.* Considerable and irregular forcing up of metacarp. III, IV, V, central destruction. Irregular bone formation. Mixture of old and new tuberculous processes.

*Clinic.*  $13/8$  20. Hand has been completely healed for 8 months. Strength good, and full function.

*Roentgen.*  $13/8$  20. Fine healing up of the processes with newly-formed strong and normal structure, and smoothing-down of contours.

*Treatment.* Carbon arc-light.

**Conclusion.** 1) Tuberculous ostitis can heal spontaneously, but cosmetically and osteologically the result is far nicer after light treatment, being also considerably expedited. 2) Extensive spina ventosa which has been operatively treated during 8 years, with constant relapse, heals nicely with 6 months' treatment by light.

No. 5. Patient 4332. K. J. 20 years. Woman (Figs. 10, 11).

*Ostitis ulnae d. c. abscessu. Arthr. carpi.*

*Clinic.*  $22/10$  18. During about 8 months pains, swelling, and tenderness of distal III of ulna side of *left fore-arm*. Treated with fomentation. There is now considerable swelling and «soreness from boils». Motility of wrist restricted to half. Rotation completely ceased.

*Roentgen.*  $23/10$  19. *Right wrist region*. In extrem. inf. ulnae is an illumination the size of a nut merging into proc. styl. and occupying part of the articular surface. There are also considerable periosteal coverings on the inner side of ulna, a little higher up, also small illuminations in the bone here.

*Clinic.*  $28/4$  20. Can use hand for light work. No swelling, fistula, or atrophy. Supination a little restricted. Other movements free.

*Roentgen.*  $29/4$  20. Process completely healed up. Structure and contour of ulna seen to be normal.

*Treatment.* Carbon arc-light. — Puncture.

**Conclusion.** A large ostitis extrem. inf. ulnae with affection of the joint can heal without a trace clinically as well as roentgenologically in adults.

No. 6. Patient 6417. G. J. Aged 12 years. Girl (Figs. 12, 13, 14, 15, 16).

*Spina ventosa metacarpi IV d.*

*Clinic.*  $18/2$  20. During 3 months swelling and pains in *back of right hand*. There is now moderate swelling over caput of metacarp. IV. Considerable tenderness, atrophy, and muscular relaxation. Also slightly restricted motility of 4<sup>th</sup> finger.

*Roentgen.*  $20/2$  20. *Right hand*. Typical very pronounced spina ventosa of metacarp. IV, with heavy periosteal covering on distal half of diaphysis and considerable central destruction here.

*Clinic.*  $21/6$  20. Constant visible swelling of metacarp. IV, where solid, osseous thickening can be felt. Finger movements free. 4<sup>th</sup> finger shortened about  $1\frac{1}{2}$  cm.

*Roentgen.*  $11/5$  20. Settling of diaphysis of Metacarp. IV, which is greatly deformed, but with commencing structure formation in the part destroyed.

*Clinic.*  $3/9$  20. No complaints. Still slight osseous swelling though less than before.

*Roentgen.*  $10/9$  20. Increasing structure formation. Caput metacarpi has settled into the diaphysis, and here is almost hidden by the periostitis.

*Clinic.*  $6/12$  20. No pains. Hand unchanged.

*Roentgen.*  $9/12$  20. Increasing structure, and distinct tapering of Metacarp. IV.

*Clinic.*  $13/4$  21. *Right hand* completely natural apart from insignificant swelling of metacarp. IV.

*Roentgen.*  $21/6$  21. Nice, almost completely natural and strong structure, with smoothing-down of the contour. Metacarpus has resumed its natural form, but is shortened about 1 cm.

*Treatment.* Carbon arc-light.

**Conclusion.** Clinical and roentgen examinations show a typical development and healing of a severe ostitis metacarpi (spina ventosa).

The tuberculous ostitis can be indicated in 3 stages. 1) Obliteration of structure. 2) Periosteal re-action, and visible central destruction with forcing-up of the bone. 3) Smoothing-down of the periostitis with new formation of the natural shape and structure of the bone.

No. 7 A. Patient 6074. V. L. Aged 5 years. Boy (Figs. 17, 18, 19, 20).

*Arthr. tub. pedis sin. (Arthr. tub. manus dext.) (Epididymitis tub. sin. (Otitis med. supp.).*

*Clinic.*  $27/11$  19. For about 6 months general relaxation and swelling of *left ankle-joint* (of *left* scrotal half and *right* carpus). There is now diffuse swelling round both malleoli (+ 1 cm.). Motility completely free. No pains. No tenderness.

*Roentgen.*  $8/12$  19. *Left ankle-joint.* Nothing abnormal apart from slight atrophy of the bone.

*Clinic.*  $8/7$  20. Considerable fluctuating swelling behind *left* mall. int. No tenderness. Motility  $110^{\circ}$ — $130^{\circ}$ . Side movements free.

*Roentgen.*  $1/7$  20. *Left ankle-joint,* considerable destruction of articular surfaces on tibia and talus. ( $19/3$  20, the articular surface of tibia found somewhat uneven).

*Clinic.*  $11/3$  21. *Left foot* stands in somewhat tapering position. Only doubtful thickening round the ankle-joint itself, but more thickening round mall. int. No pains. Side movements free.

*Roentgen.*  $3/3$  21. *Left ankle-joint.* In all essentials conditions as on  $27/11$  20, though, if, anything, with increase of destruction. But at the same time with improved structure in the adjoining bone. ( $26/11$  complete obliteration of joint-fissure, and considerable atrophy of the bone).

*Clinic.*  $5/7$  21. *Left foot* forms an angle of about  $120^{\circ}$ , with very slight flexion motility of crus. Side movements good. Distinct infiltration behind both malleoli. No tenderness or pains.

*Roentgen.*  $20/6$  21. *Left ankle joint.* The process does not seem to be propagated. Structure better. The contours of the articular surfaces of talus and tibia can be seen, and a joint-fissure seems to be re-forming.

*Treatment.* Quicksilver — quartz light. Confinement to bed. Plaster of Paris bandage. Also treatment of patient's other affections (hand, epididymis, ear). *N. B.* Patient still under treatment.

**Conclusion.** 1) Tuberculous arthrititis most often reveals itself first clinically and later roentgenologically. 2) Even if propagation of arthrititis is found roentgenologically, there may quite well be an improvement clinically, and certainly the latter best expresses the condition.

No. 7 B. Patient 6074. V. L. Aged 5 years. Boy (Figs. 21, 22, 23, 24).

*Arthr. tub. manus dext.*

*Clinic.*  $27/11$  19. Diffuse swelling over entire *back of right hand*, concerning both bones and capsule. Great tenderness. Movement of wrist very restricted.

*Roentgen.*  $8/12$  19. *Right hand.* Nothing abnormal apart from some bone atrophy.

*Clinic.*  $11-26/3$  20. Considerable swelling of *right hand*, especially over the radio-carpal joint, extending to centre of middle of hand. Dorsalflex.  $0^{\circ}$ , volarflex.  $70^{\circ}$ , radialflex.  $0^{\circ}$ , ulnarflex.  $20^{\circ}$ , pro- and supination free. Great tenderness.

*Roentgen.*  $27/3$  20. *Right wrist.* Unquestionable destruction of all carpal bones, especially of os capitatum and os hamatum, also base of metacarp. III and especially metacarp II, with indistinct outline of the defects, and considerable diffuse bone atrophy.

*Clinic.*  $23/11$  20. General condition good. Some diffuse swelling of hand, no tenderness. Motility almost as on  $11/3$  20.

*Roentgen.*  $26/11$  20. Destruction of carpal bones essentially increased, especially the entire proximal half of os capitatum has settled and the remaining part forms

an inseparable conglomeration with all neighbouring bones. Only os multangulum minus seems to have escaped. In spite of this increased destruction there is however, improved structure in what remains.

*Clinic.*  $19/5-5/7$  21. General condition good. Now only slight swelling of *right wrist*. Only slight infiltration can be felt. Dorsal flex.  $0^\circ$ , volar flex.  $60^\circ$ , ab- and adduct. good. Pro- and supination free. Handshake vigorous.

*Roentgen.*  $27/6$  21. Structure of all bones now almost natural. The contours sharply portraying considerable defects, but with commencing new formation of the joint-fissures.

*Treatment.* Quicksilver — Quartz light — Splint bandage.

**Conclusion.** 1) In the initial stage of tuberculous arthrititis considerable clinical changes may be found, *without one being able to prove anything abnormal roentgenologically; one may do so several months later.* 2) *Together with clinical improvement there may be seen considerable roentgenologic deterioration, but improved structure in the surroundings (or bone remains) is seen as a sign of the limit of the process.*

No. 8. Patient 5255. E. R. Aged 2 years. Girl. (Figs. 25, 26, 27, 28).

*Arthr. tub. cubiti sin. c. abscessu. Ostit. tub. multilocularis.*

*Clinic.*  $12/5$  19. Two months ago trauma of *left elbow*, after which swelling and restricted motility. Now there is diffuse swelling of the bones and fleshy parts (+ 1.5 cm.) Motility  $60^\circ-140^\circ$ . Pro- and supination free. No tenderness or pains. Skin on the back thin and cyanotic.

*Roentgen.*  $16/5$  19. *Left elbow.* Considerable destruction of extrem. sup. ulna including the articular surface; also considerable periosteal coverings. Humerus and radius free.

*Clinic.*  $3/8$  19. Swelling somewhat decreased. Movements a little freer.

*Roentgen.*  $21/8$  1919. Destruction unmasked, occupies part size of large walnut. Is sharply defined against the adjoining sound parts of the bone (dorso-distally), where denser bone tissue is seen (re-action). Periostitis well diminished and of almost same density and structure as the bone.

*Clinic.*  $15/5$  20. No complaining. Uses his arm. No apparent swelling of elbow. No tenderness. Motility  $50^\circ-135^\circ$ . Pronat. free. Supinat. minus  $15^\circ$ . No atrophy.

*Roentgen.*  $15/5$  20. Considerable and nice healing-up of the process with new formation of destructed portion and of articular surface. Periostitis completely disappeared, contour smooth, structure still somewhat irregular, but dense.

*Clinic.*  $1/6$  21. Arm completely in order. Nothing to remark about it. Motility free.

*Roentgen.*  $6/7$  21. Ulna now seen natural. Structure and contours regular and nice.

*Treatment.* Quick silver. Quartz light.

**Conclusion.** A considerable destruction in extrem. sup. ulnæ with affection of the joint can heal without a trace and with complete restitutio ad integrum.

No. 9. Patients 3889. J. J. Aged 28 years. Woman. (Figs: 29, 30).

*Arthr. manus tub. dext. c. abscess. (Tub. pulm. adenit. colli).*

*Clinic.*  $4/6$  18. During about 3 months a slowly growing tender swelling on radial side of *left wrist*. Has not been able to attend to her occupation (piano).

Now the *left wrist* is seen placed fully extended, pronated, about  $20^\circ$  radial inflected, firmly fixed. Dorsal flex.  $0^\circ$ , volar flex.  $40^\circ$ , side movements 0. Considerable swelling of entire joint, especially round the radial side, where there is an abscess hardly the size of a hen's egg. Severe atrophy. Weak handshake.

*Roentgen.*  $\frac{2}{16}$  18. *Left wrist.* Uneven periosteal covering on the outer side of extrem. inf. radii. No distinct bone focus. Patchy and extensive bone atrophy in all wrist bones. Joint-fissures all seem well preserved.

*Clinic.*  $\frac{2}{1}$  1920. An ulceration on hand has been healed for about 9 months. She has used her hand for light work and piano for about 6 months. No pains. Position of hand natural. Dorsal flex.  $80^\circ$ , volar flex.  $80^\circ$ , ulnar flex.  $0^\circ$ , radial flex. natural ( $30^\circ$ ) Pro- and supination free. No swelling. Some atrophy. Hands-hake a little weaker than on left side.

*Roentgen.*  $\frac{2}{1}$  20. *Left wrist.* The periostitis on radius completely disappeared. In its place is seen a somewhat irregular flat defect sharply defined, the result no doubt of a now firmly healed process here. Structure in all bones now seen completely natural.

*Treatment.* Universal carbon arc-light, and local light treatment. ( $\frac{25}{8}$  20). Hand now completely natural without a trace of swelling or restriction of movement. Plays much as music-teacher. *Roentgen picture* now shows completely natural conditions.

**Conclusion.** An extensive tuberculosis of the wrist (in adults) with affection of capsule and bones can heal completely with restoration of normal appearance, free motility, and full strength.

No. 10. Patient 6625. A. P. Aged 20 years. Woman (No Figure).

*Arthr. tub. cubiti sin.*

*Clinic.*  $\frac{9}{4}$  20. About 3 years ago weakness and restricted movement began in *left elbow*. Later pain with movement and swelling of joint. The condition deteriorated under treatment with quartz light (infirmary), and improved under treatment with sun-baths. *Left elbow* is now seen inflected to  $135^\circ$ , and from here about  $15^\circ$  active and passive movement. Tenderness on epicond. lat. and pains with movement. Atrophy of upper arm and fore-arm. Considerable diffuse swelling with obliteration of the contours.

*Roentgen.*  $\frac{9}{4}$  20. *Left elbow.* Considerable destruction of extrem. sup. ulnæ, with entire facies articularis; neither this nor trochlea is seen, and the whole of this area forms a structureless whole only sharply defined from the adjacent part of the bone. On the outside of extrem. inf. humeri some periosteal covering is seen. No doubt it is a question of an old propagating tub. arthr.

*Clinic.*  $\frac{17}{2}$  21. No complaints. Uses the arm a little every day. Thinks there is good progress. Very slight diffuse swelling of *left elbow* is now seen. Motility  $100^\circ$ — $130^\circ$  (active). No pains. Supination to edgewise position. Pronation free.

*Roentgen.*  $\frac{21}{1}$  21. *Left elbow.* One now sees a distinct joint-fissure of about normal width, but somewhat irregular and indistinct. New bone tissue has formed both in ulna and humerus, though in both still a defect corresponding with the articular surfaces. Destruction of capitulum radii also seems to have taken place, but the structure here as in the other bones is now quite good though still somewhat halisteretic.

*Treatment.* Carbon arc-light. Mitella.

**Conclusion.** Considerable tuberculous arthrititis in the elbow-joint (in adults) can heal with new formation of articular cartilage and good function.



No. 11. Patient 4096. L. J. Aged 29 years. Woman (Figs. 31, 32, 33).

*Arthr. tub. humeri sin. (Tub. pulm).*

*Clinic.*  $20/7$  18. About 18 months ago pains began in left shoulder, treated with massage. A little later treated at sanatorium for tub. hæmoptysis). A month ago sudden severe pains in *left shoulder*, which went away with rest. Can now use the arm again (*Roent. picture* on  $22/4$  18 showed nothing abnormal apart from slight atrophy — *Panner*). Slight atrophy of m. deltoideus is now seen. No tenderness. Abduction slightly restricted, also circumduction, which causes a good deal of pain. No grinding.

*Roentgen.*  $1/11$  18. *Left shoulder.* Nothing abnormal apart from slight atrophy of the bone.

*Clinic.*  $4/10$  20. A good deal of unrest in *left shoulder*, but no real pains. Works in a factory; can't bear to lift her arm. Insignificant atrophy of deltoideus. Motility completely free.

*Roentgen.*  $23/10$  20. *Left shoulder.* There is now seen a falcate, nail-sized defect ca. 1 cm. deep on upper part of caput humeri, continuing as an indistinctly defined illumination into the bone, no doubt as a sign of a tuberculous focus which had not manifested itself at roentgen exam.  $11/1$  18.

*Clinic.*  $22/6$  21. On and off pain in *left shoulder*. Nothing new at examination. Motility quite free.

*Roentgen.*  $23/6$  21. *Left shoulder.* The defect mentioned seen a little larger than on  $23/10$  20, but sharply defined, and with strong bone structure in the surroundings. The process thus seems to have quieted down.

*Treatment.* Carbon arc-light (with long interruptions of intercurrent illnesses and stays in sanatorium).

**Conclusion.** 1) Tuberculosis of the shoulder-joint (in adults) may limit itself and finally result in a joint completely capable of function. 2) A clinically suspected affection of caput humeri may present a normal roentgen aspect. The area around tuberculum maj. is particularly difficult to judge, and the tuberculosis is often found just at this place answering to the capsular attachments.

No. 12. Patient 4576. K. T. Aged 9 years. Girl (Figs. 34, 35, 36).

*Arthr. cubiti sin. Ostitis p. mag. ulnae. c. abscessu.*

*Clinic.*  $9/12$  18. About 9 months ago pains, tenderness, and some swelling of upper third of *left fore-arm*. Condition rather stationary. No treatment. Is now found distally from *left olecranon* an abscess the size of a hen's egg ( $7/12$  18 punctured, after which injection of iodoform glyc.) The capsule of the elbow-joint somewhat distended. Skin natural. Motility  $160^{\circ}$ — $60^{\circ}$ .

*Roentgen.*  $11/12$  18. *Left elbow.* Extrem. sup. ulnae seat of enormous forcing-up, especially in front and medially. Also 3 large illuminations up to the size of a pigeon's egg are seen in the bone, rather sharply defined. The contours of ulna also rather sharp, and without distinct periosteal covering. One cannot decide how far the articular surface is affected. The process resembles a severe tuberculous osteitis, with tendency to heal. Dorsally of ulna is seen the injected iodoform.

*Clinic.*  $24/9$  19. Has been to country for 4 months. Had light baths during 5 months. After these ( $21/5$  19) no pains. Motility  $50^{\circ}$ — $175^{\circ}$ . Supination slightly restricted. Slight swelling round ulna. Appearance now all right. Slight thickening of ulna. Motility quite free. No abscess.

*Roentgen.*  $\frac{20}{9}$  19. *Left elbow-joint.* Swelling of ulna considerably diminished. Illuminations fewer and smaller, and all contours show up sharply. Structure good. Iodoform resorbed.

*Clinic.*  $\frac{23}{6}$  21. *Left elbow-joint.* During last 6 months ( $\frac{9}{1}$  20) has been completely normal in appearance and motility. Nothing abnormal now.

*Roentgen.*  $\frac{23}{6}$  21. *Left elbow.* In the centre of extrem. sup. ulnæ a cavity the size of good-sized nut, sharply defined from completely natural bone tissue. For the rest, the bone further reduced and seen to be of normal width in dorsivolar projection.

*Treatment.* Quartz light, carbon arc-light, quartz light (N. B. Patient has had no erythema, and hardly any pigmentation.)

**Conclusion.** 1) Tuberculous ostitis showing tendency to heal and left to itself displays a very irregular method of healing (osteologically), but under light treatment more approaches natural conditions. 2) No inconsiderable deformity of extrem. sup. ulnæ with central defect can exist simultaneously with a good function of the joint.

\*

The extracts of histories and roentgen examinations with conclusions here reported are, as mentioned above, extracts from a larger material showing the conditions which, by the examples given, I think I can establish as of universal validity and not exceptional. If the principles here given for roentgen examination are followed for a few years one will through this no doubt obtain a very fine material for judging the osteological conditions of tuberculosis of the bones with conservative treatment, and hereby arrive at a more pregnant conception of the importance of light treatment.

My preliminary material shows, I think, various interesting conditions of surgical tuberculosis, as proved by the conclusions. Now I shall only emphasize a few of them as a summary.

## Summary

1) Even if the roentgen aspect reveals no sign of tuberculous changes, it doesn't exclude the possibility of the affection being tuberculous (History No. 7 B and No. 11).

2) Sometimes the roentgenological changes only come at a moment when the clinical symptoms have considerably improved, (History No. 7 A and 7 B) as first emphasized, I think, by ERNST.

3) The light treatment of surgical tuberculosis can yield extremely fine results, even where serious roentgenological changes are found, for which reason one cannot, on the basis of these alone, give a bad prog-





Fig. 1

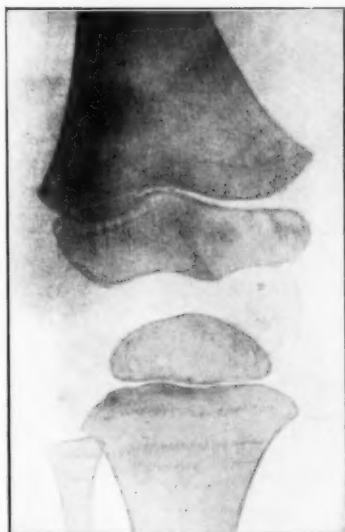


Fig. 2

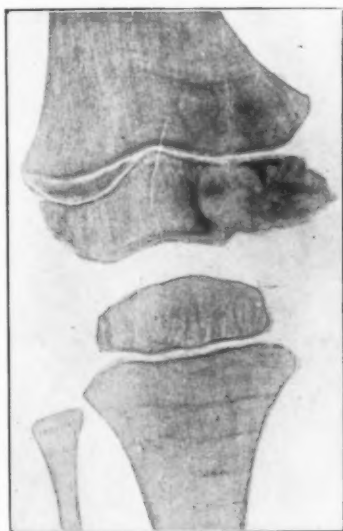


Fig. 3



Fig. 4

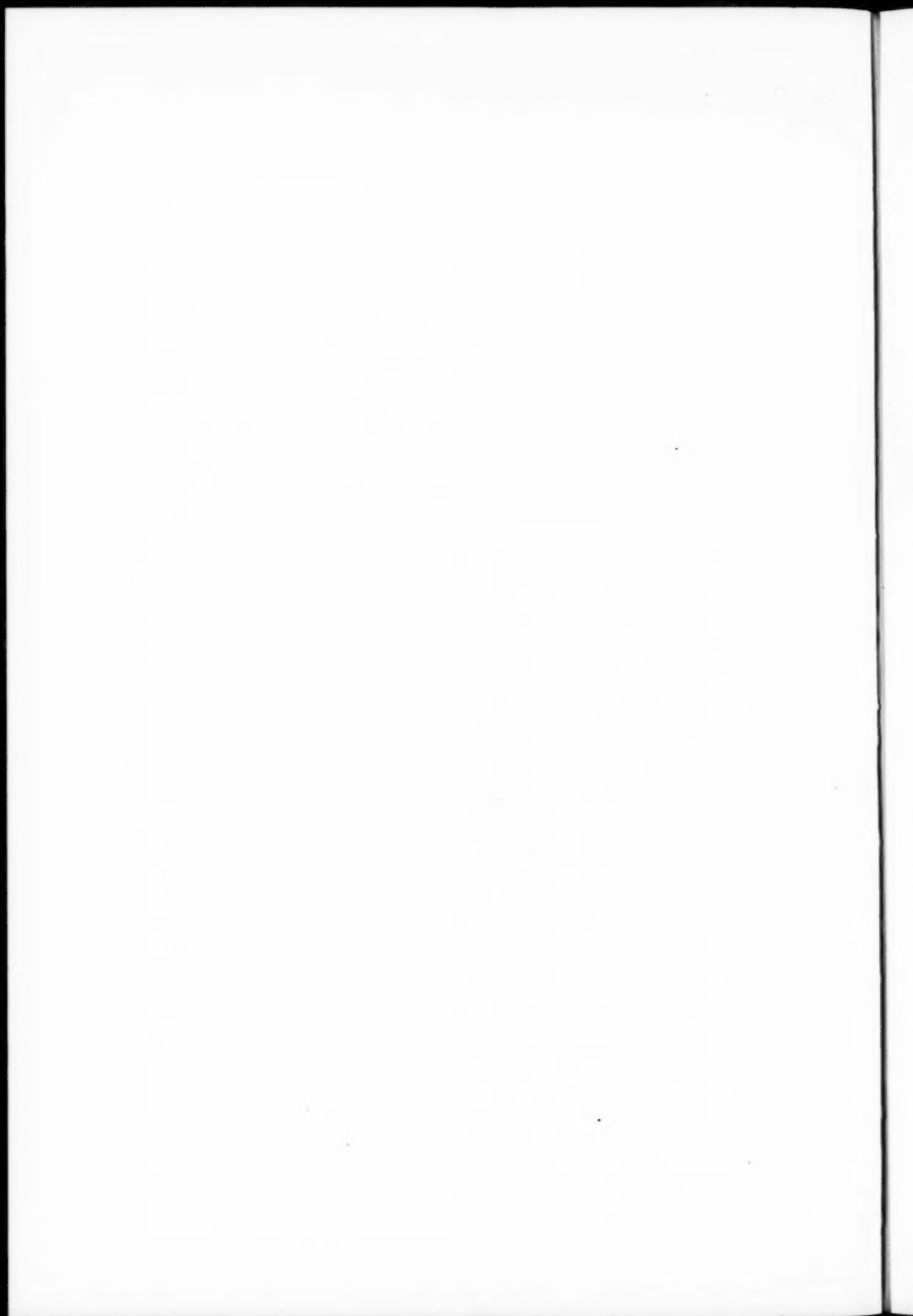




Fig. 5



Fig. 6



Fig. 7

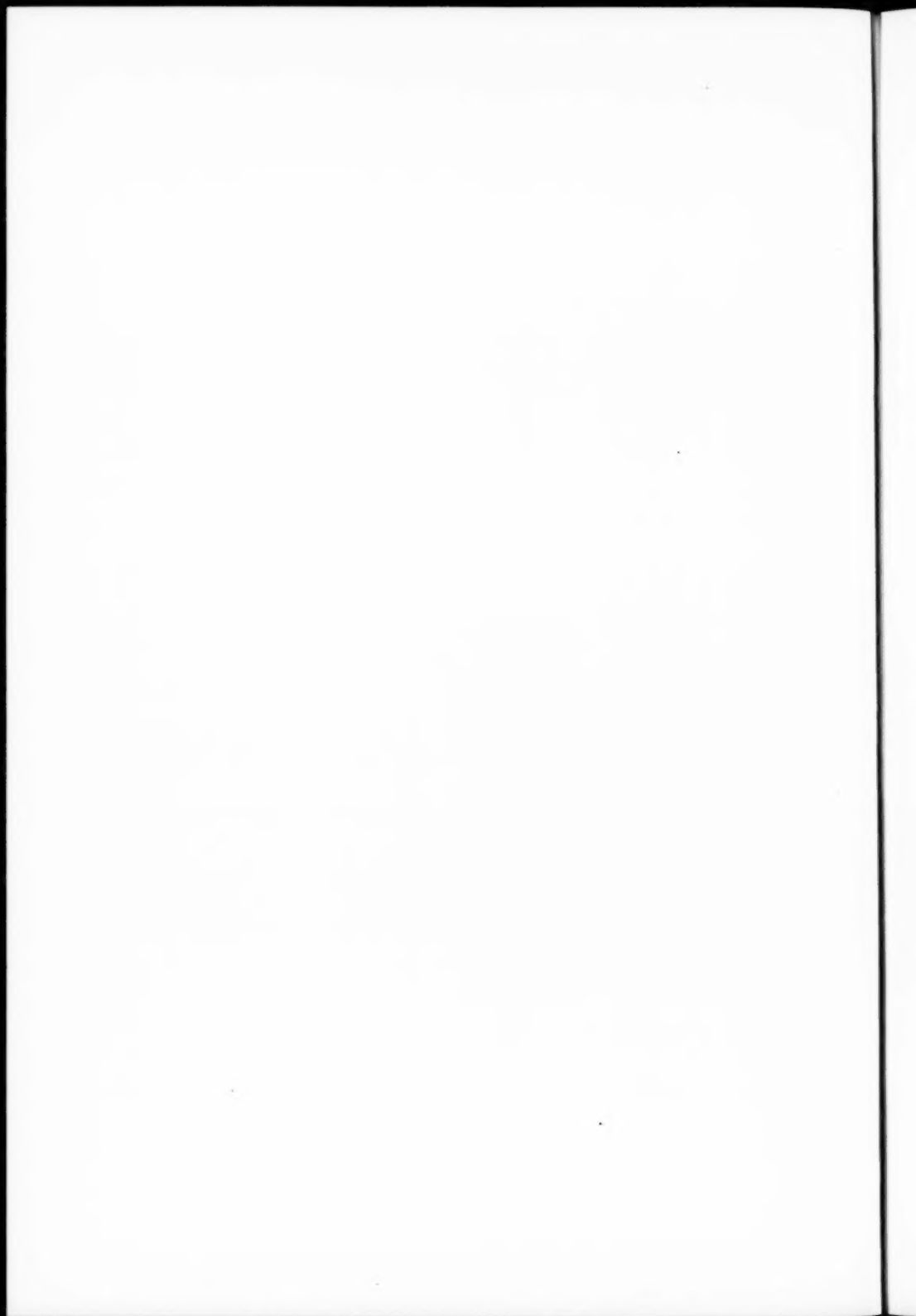




Fig. 8



Fig. 9



Fig. 10



Fig. 11

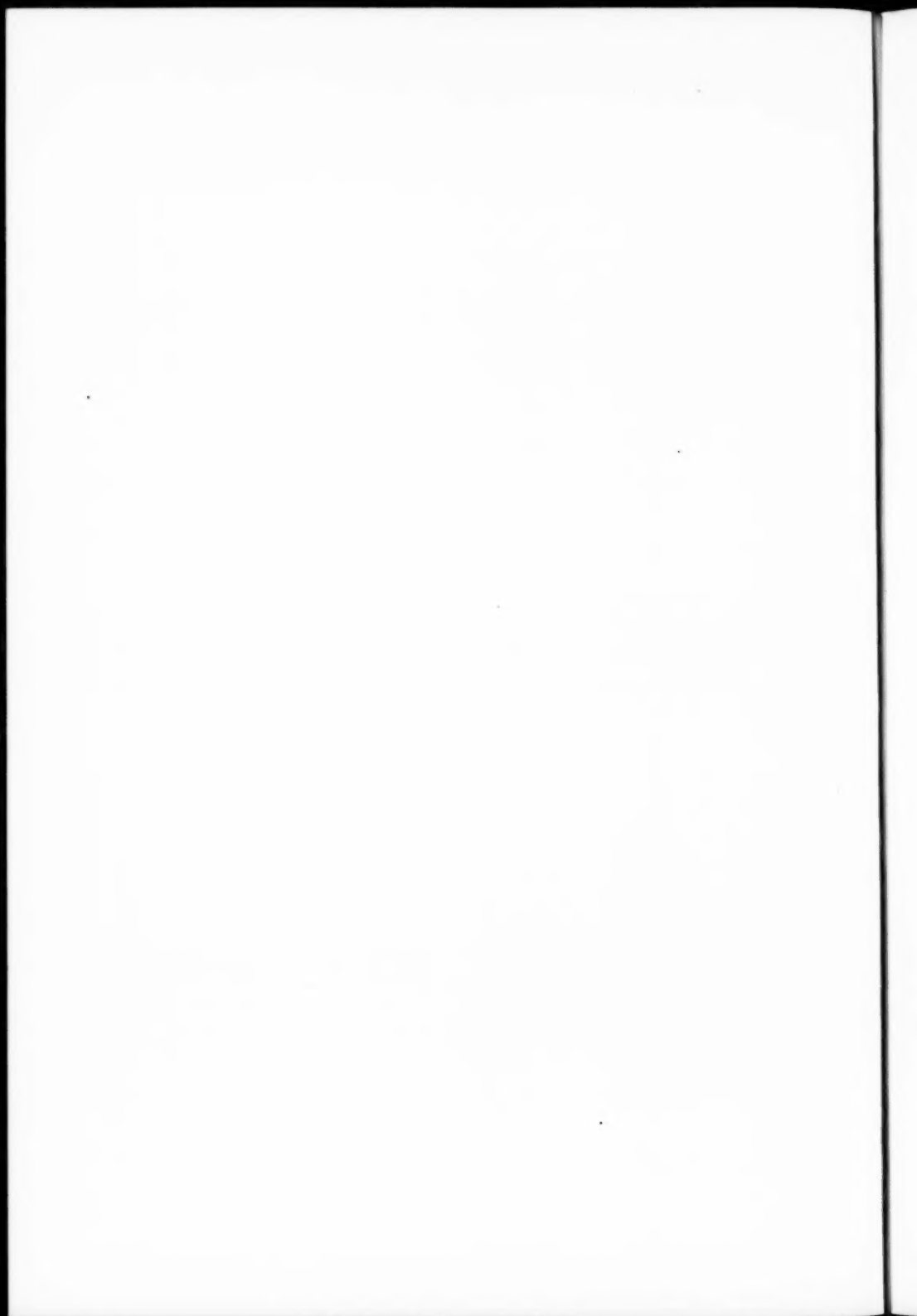




Fig. 12



Fig. 13



Fig. 14



Fig. 15



Fig. 16

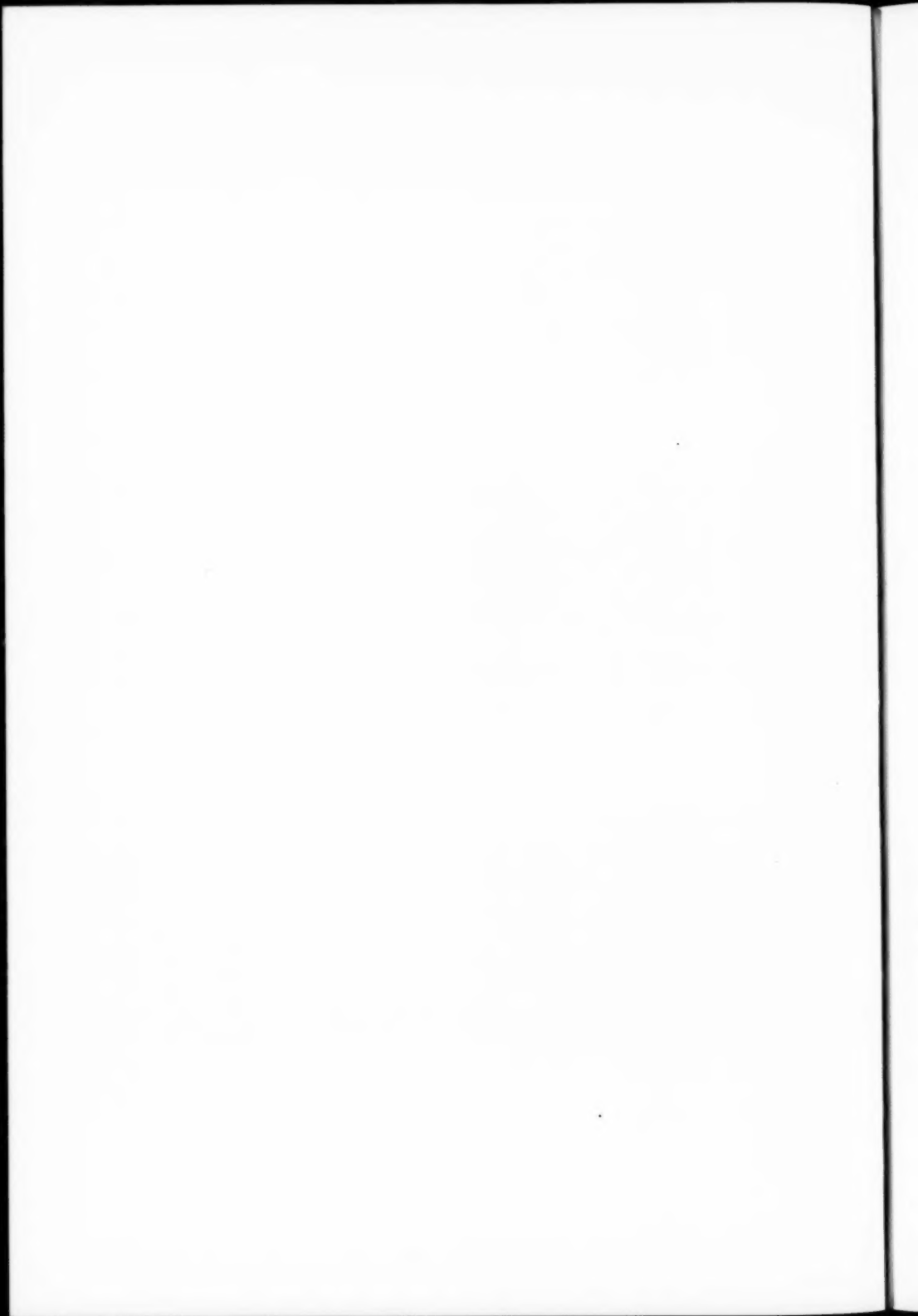






Fig. 17.

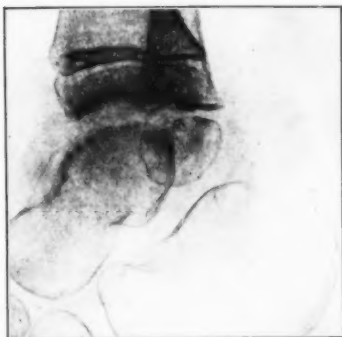


Fig. 18



Fig. 19

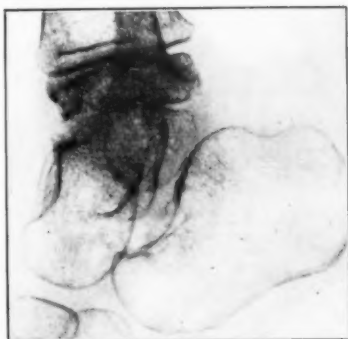


Fig. 20



Fig. 21



Fig. 22

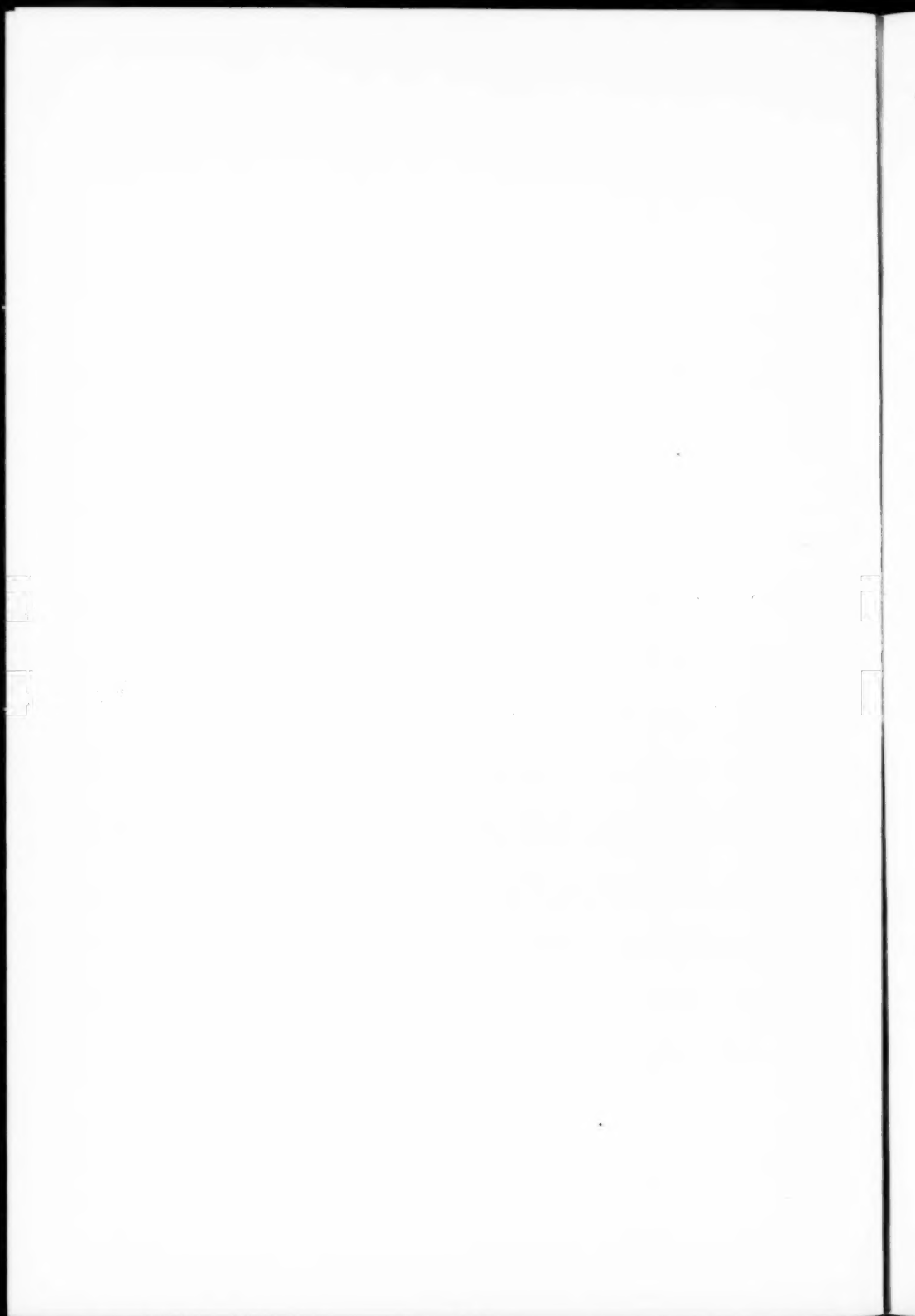




Fig. 23



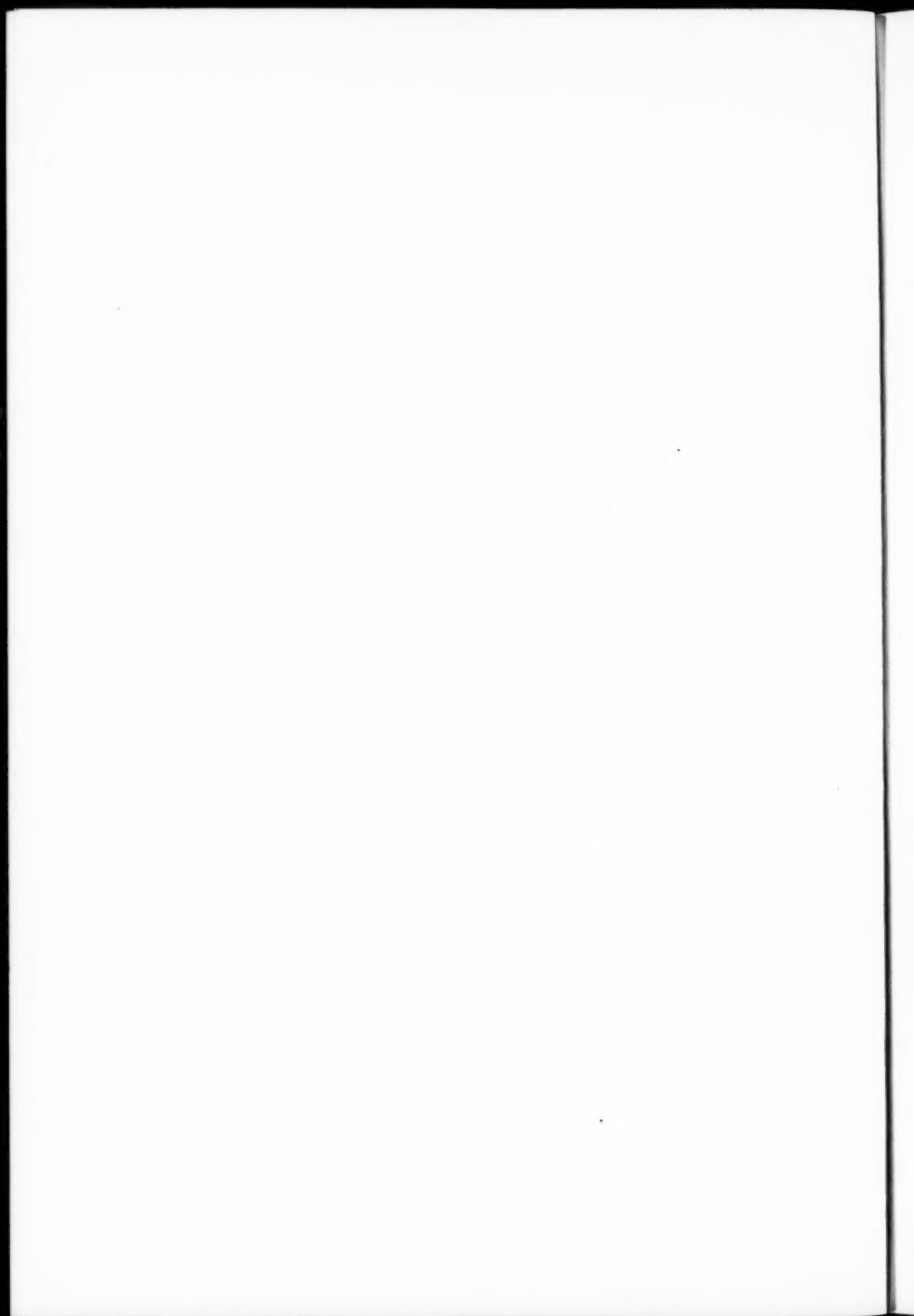
Fig. 24



Fig. 25



Fig. 26



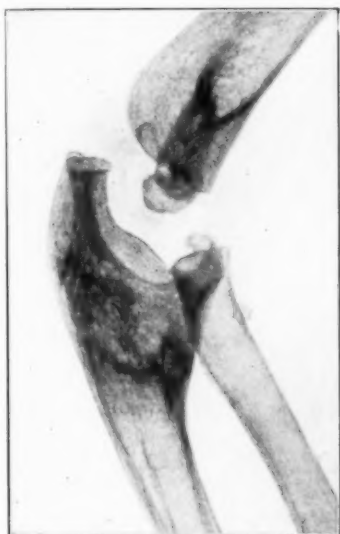


Fig. 27



Fig. 28



Fig. 29



Fig. 30

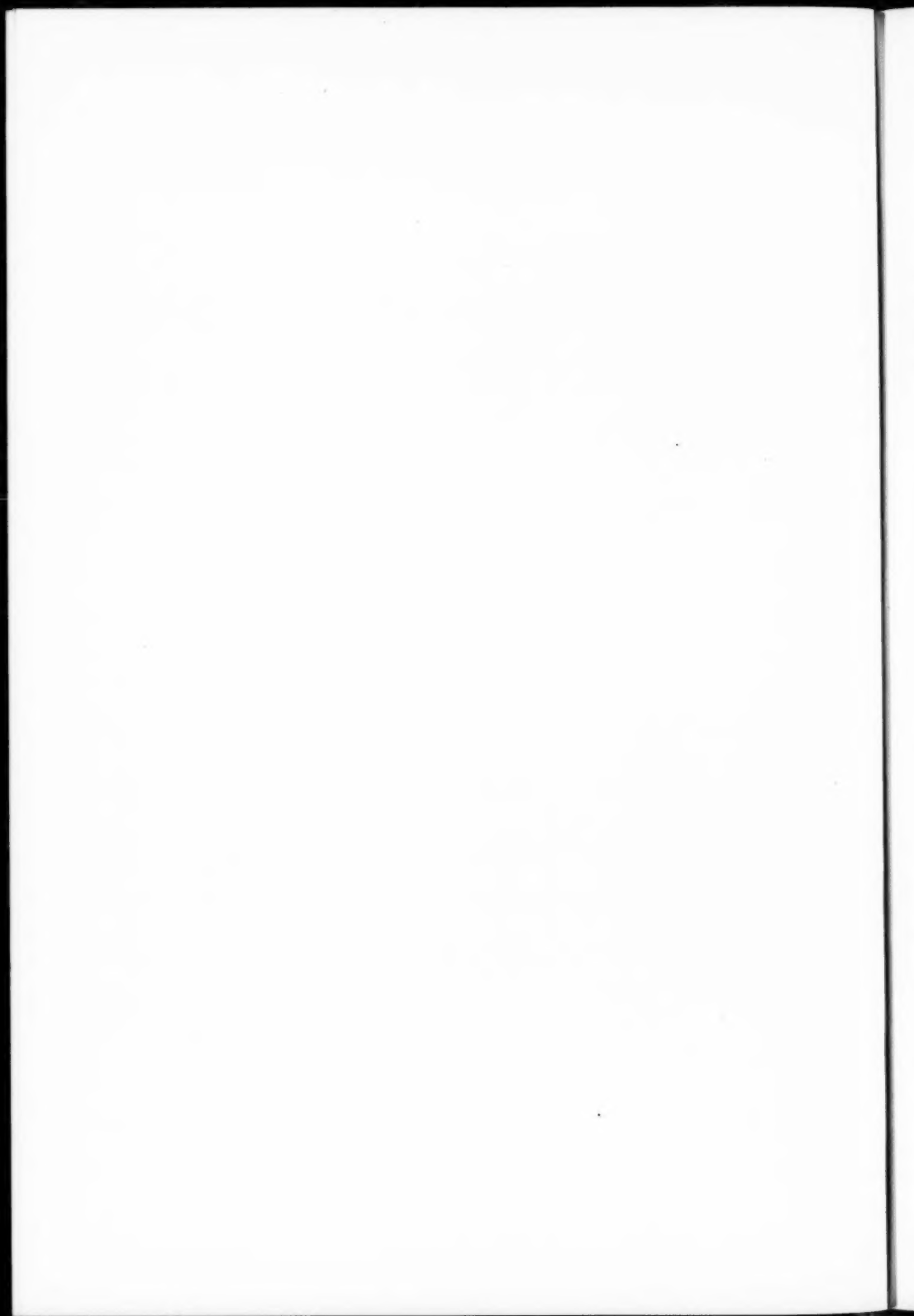




Fig. 31



Fig. 32



Fig. 33

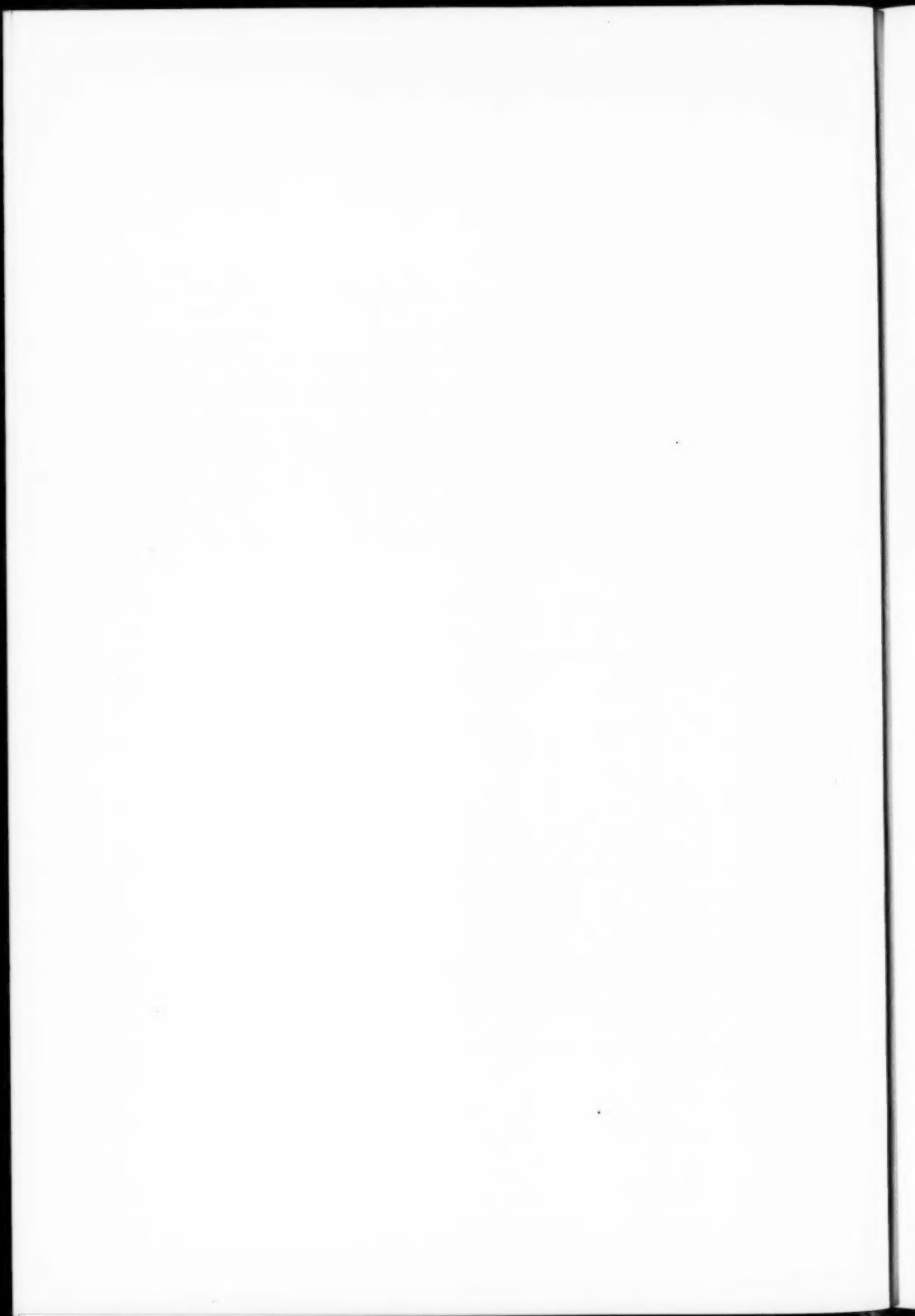






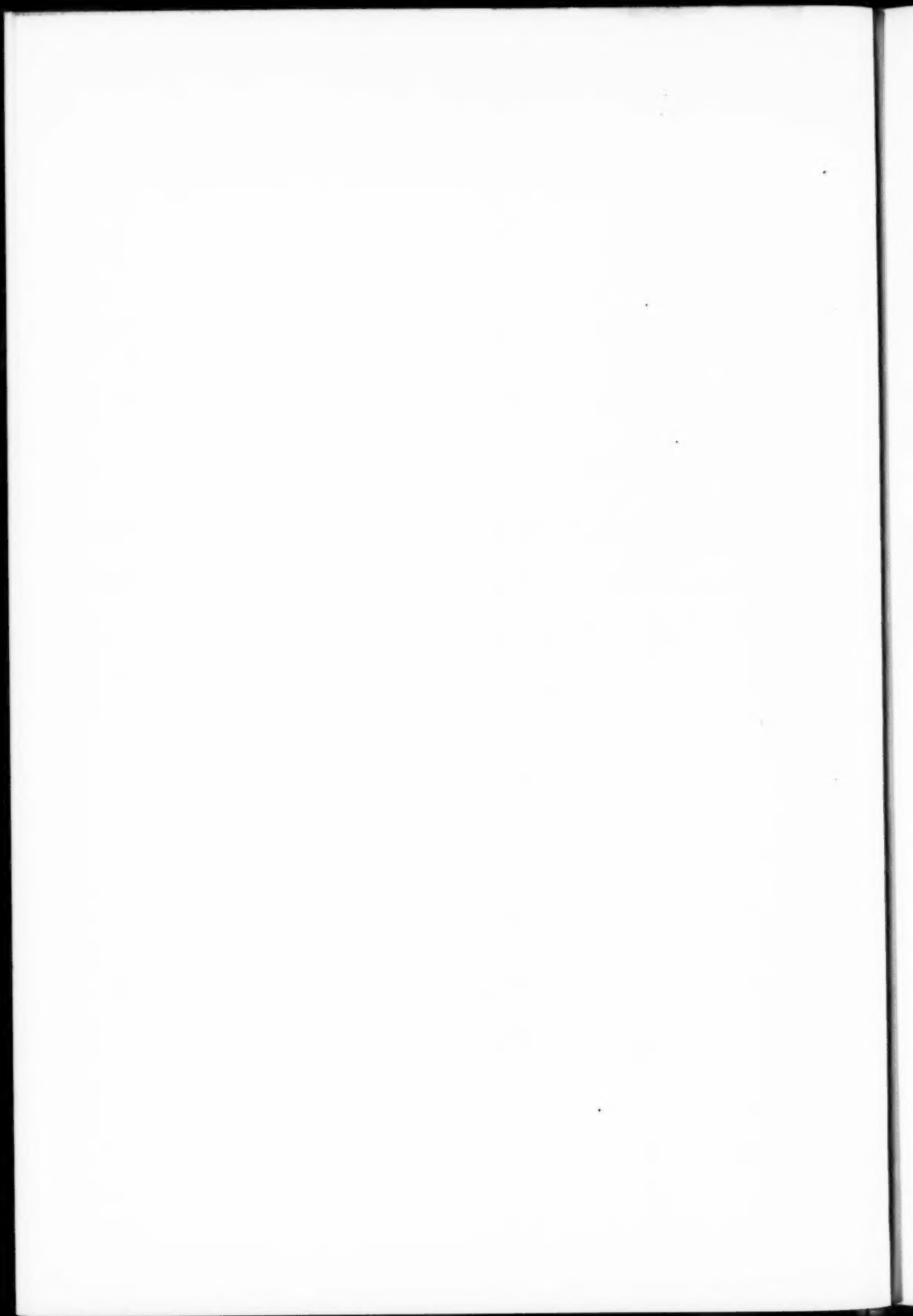
Fig. 34



Fig. 35



Fig. 36



nosis; because even very large destructions may be repaired with light treatment (Histories 2, 3, 5, 6, 8, 9, 10, 12).

4) The complete roentgenological healing may occur long after the clinical symptoms have disappeared (History 12).

5) Tuberculous ostitis can heal spontaneously, but under light treatment the result becomes cosmetically and roentgenologically far nicer, and is attained more quickly (Histories 4, 12).

6) Simultaneously with clinical improvement considerable roentgenological deterioration is seen at times. In reality this is merely the sign of the diseased material being resorbed.

7) Extensive arthrititis in hand, ankle, knee, and elbow-joint can heal with new formation of articular cartilage and good function.

8) A joint-end seen deformed roentgenologically can occur simultaneously with a completely free function clinically.

It is with pleasure that in conclusion I ask my chief, Dr REYN, to accept my best thanks for granting me the use of the material, and for the great interest with which he has followed my work. As mentioned in the introduction, this is only a temporary work, and it is my hope that the steadily increasing material at the Finsen Institute will give me an opportunity of continuing these investigations.



## Ein Beitrag zur Röntgenologie der echten Mischgeschwülste des Rumpfes

von

*Hugo Laurell*

Wie bekannt kommen in den echten Mischgeschwülsten — Dermoidzysten, Teratomen und damit nahe verwandten Geschwulstformen — nicht selten Knochen- und Zahnanlagen vor. Da Knochenbildungen sich oft röntgenologisch leicht beobachten lassen, so kann eine Röntgenuntersuchung bei diesen Tumorformen von grossem diagnostischem Werte sein. Dies ist besonders dann der Fall, wenn wohl entwickelte und identifizierbare Zähne in dem Tumor vorhanden sind. Dann ist die Diagnose eines Dermoids oder damit verwandten Tumors meist ohne weiteres klar. Nur verschluckte Zähne kommen dann differentialdiagnostisch in Betracht. Wenn dagegen unvollständig entwickelte oder missgebildete Zähne, die deshalb nicht sicher erkennbar sind, oder wenn unregelmässige, bisweilen mehr oder weniger konkrementähnliche Knochenanlagen auf der Platte sichtbar sind, so kann die Diagnose schwieriger sein. Differentialdiagnostisch müssen dann je nachdem, ob ein palpabler Tumor vorhanden ist oder nicht, und je nach dessen Lage und den klinischen Daten verschiedene Möglichkeiten in Erwägung gezogen werden, welche jedoch hier nicht diskutiert werden sollen.

Schon i. J. 1900 bildete WILMS in Hegars Beiträgen z. Geburtshilfe ein Röntgenogramm eines exstirpierten Teratoms ab, welches deutliche Zahnanlagen zeigte, sowohl mehr isolierte als auch in Gruppen stehende, von denen ein Teil in kleinen als Kieferanlagen aufzufassenden Knochen sass. W. wies auf den Wert einer Röntgenuntersuchung für das topographische Studium dieser embryoiden Geschwülste hin.

I. J. 1906 betonte LEXER hinsichtlich der Diagnose der Bauchteratome die Bedeutung der Röntgenuntersuchung für den Nachweis von Extremitäten und Zähnen in diesen Geschwülsten.

I. J. 1912 untersuchte WEIL intra vitam einen Fall von Lungentumor röntgenologisch und beschrieb ihn, wobei er ihn als eine Dermoidzyste oder als ein Teratom deutete. Der über faustgrosse, eiförmige Tumor hatte

eine scharfe, abgerundete Grenze gegen das freie Lungenparenchym zu und enthielt in seinem Zentrum einen grösseren und einen kleineren kalkdichten Herd, von denen der letztere besonders stark zackig war. Er hatte jedoch keine Gelegenheit seine Diagnose verifiziert zu sehen, da der Fall weder zur Operation noch zur Sektion kam.

Dermoide in der Lunge und im Mediastinum ohne Knochen- und Zahnanlagen können röntgenologisch mit noch geringerer Sicherheit diagnostiziert werden, da sie leicht mit anderen rundlichen Tumoren, vor allem mit Echinokokkus verwechselt werden können. Solche Dermoide ohne Knochenanlagen wurden von vielen Verff. im Röntgenbilde beobachtet (z. B. von KÄSTLE, POWELL, HARTLEY, PAYER und ASSMANN). Sie zeichnen sich gewöhnlich mit einer scharfen, gerundeten Kontur gegen das Lungenparenchym ab. Zu den echten Mischgeschwülsten gehört auch der von EDLING, BORELIUS und SJÖWALL beschriebene Fall eines soliden Lungentumors mit organoidein Bau.

SÖDERLUND scheint der erste zu sein, der Gelegenheit hatte eine Dermoidzyste röntgenologisch mit Sicherheit zu diagnostizieren. Es handelte sich um eine Ovarialzyste, an der eine Stieldrehung stattgefunden hatte, und welche u. a. einen vollkommen entwickelten Zahn mit sichtbarem Wurzelkanal enthielt. Dieser Fall wurde von JOSEPHSON operiert und von ihm i. J. 1915 in der Hygiea beschrieben. J. betont im Anschlusse an diesen Fall, welchen diagnostischen Wert eine Röntgenuntersuchung bisweilen bei dunklen Tumorfällen haben kann.

SONNTAG publizierte im Juli 1920 einen von ihm röntgenologisch untersuchten Fall eines Ovarialdermoids mit einem Zahnkeim, *der einen Ureterstein vortäuschte*. Erst durch die Operation (PAYER) wurde die Diagnose klargestellt. Schon früher (1906) vermerkte ALBERS-SCHÖNBERG diese Fehlerquelle bei der Diagnose von Uretersteinen, fand allerdings in der Litteratur keinen Fall und sah auch selbst keinen. SONNTAG glaubt, jedoch mit Unrecht dass sein und PAYERS Fall der erste dieser Art ist, welcher beschrieben wurde. Ein solcher Zahn in einer Dermoidzyste im Becken einer Frau, bei welcher Symptome vorlagen, die auf einen Ureterstein hindeuteten, veranlasste nämlich schon früher (1916) THURSTAN HOLLAND zu einer ähnlichen Fehldiagnose und bei dem schon erwähnten Falle JOSEPHSONS (1915), der zur Röntgenuntersuchung kam, um einen Stein in den Harnwegen auszuschliessen, konnte SÖDERLUND auf der Platte einen Zahnschatten erkennen und so die Diagnose richtigstellen. Einen ähnlichen Fall mit richtiger Röntgendiagnose konnte kürzlich EDEIKEN in The American Journal of Roentgenology 1922 vorlegen. Er wies im Becken einer Frau eine Anzahl unentwickelter Zähne nach, die in eine Knochenmatrix eingebettet waren, ein Befund, der die Diagnose Ovarialzyste (Dermoid) ermöglichte.

I. J. 1919 hatte der Verf. Gelegenheit, einen teratoiden Tumor im oberen Teile der Bauchhöhle einer Frau röntgenologisch nachweisen zu können. Derselbe enthielt sowohl Knochen als auch Zähne. Dieser Fall, der i. J. 1919 von BERGMARK und dem Verf. in der Schwedischen Gesellschaft für interne Medizin demonstriert wurde, soll im folgenden näher beschrieben werden, da er vom klinischen und vom röntgenologischen Standpunkt aus von Interesse ist. BERGMARK und PETRÉN haben in entgegenkommender Weise die Krankengeschichte der Patientin aus der hier folgendes angeführt sein möge zu meiner Verfügung gestellt:

*Astrid S.*, 24 Jahre alt. Med. Journal Nr. 1031/1919, chirurg. Journal Nr. A. 520/1919.

Die Patientin zart gebaut. Sie war immer blass und mager. Blutarmut während der Schulzeit; sonst war sie bis Ende d. J. 1913 gesund. Zu dieser Zeit begann sie an saurem Aufstossen nach unbekömmlichen Speisen und an Schmerzen in der Magengrube zu leiden. Die Beschwerden traten bis Ende d. J. 1916 zeitweise auf. In der Zwischenzeit war sie gesund. Im Herbst d. J. 1916 war der Schmerz schwerer und die Pat. hatte zuweilen Durchfall. Ein Arzt, der um Rat gefragt wurde, diagnostizierte Magendarmkatarrh und gab Diätvorschriften. Die Beschwerden verschwanden jedoch nicht, sondern blieben seit dieser Zeit mit wechselnder Intensität bestehen.

Der Schmerz in der Magengrube kam 1—2 Stunden nach den Mahlzeiten und war von saurem Aufstossen, in den letzten Wochen auch von Übeligkeiten gefolgt. Niemals Erbrechen. Wegen der Schmerzen hat die Pat. in letzter Zeit wenig gegessen, ist aber nicht merkbar abgemagert. Ist zuweilen müde.

*Status am 22./X. 1919.*

Allgemeinzustand recht gut. Ist etwas blass. Kein Fieber.

*Bauch:* Im Epigastrium ein faustgrosser, respiratorisch verschieblicher Tumor palpabel; derselbe reicht nach abwärts bis zwei Querfinger oberhalb des Nabels und verschwindet nach aufwärts zu unter dem Rippenbogen; der Tumor fühlt sich recht hart an, seine Oberfläche ist glatt und gerundet. Der Bauch sonst weich.

*Hers und Lungen* ohne Besonderheiten. Hämoglobin nach nicht reduz. Tallqvist 70. Rote Blutkörperchen 2,630,000, weisse 5,600, davon 2,200 einkernige.

*Weber in den Faeces* einmal schwach grün, zweimal negativ.

*Urin* ohne Besonderheiten.

23./X. *Retentionsmahlzeit:* Bei Expression O. Spülwasser ohne Besonderheiten. Probefrühstück ca. 100 ccm. Kongo und Günsburg pos. Freie Salzsäure 6, Totalazidität 16.

Weber neg. Schleim 0—1.

Die Pat. wurde, da man einen Magentumor vermutete, zur Röntgenuntersuchung geschickt.

*Röntgenuntersuchung am 24. und 27./X.*

*Magensack* in stehender Stellung lang und von hypotonischer Form (siehe Fig. 1). Der Pylorus ist stark gesenkt und liegt in Nabelhöhe. Die Pars ascendens nahezu horizontal verlaufend. Der Magen zeigt überall geschmeidige Wände. Die Kanalisperistaltik normal. Keine Retention nach 4 Stunden.

Der palpable Tumor, der teilweise bei der Durchleuchtung sichtbar ist, befindet sich, wenn die Pat. steht, in unmittelbarer Nähe und oberhalb der Pars horizontalis sup. duodeni und der Pars ascendens ventriculi, oder, wie es in diesem Falle richtiger heissen sollte, der Pars horizontalis ventriculi. Der sichtbare Teil des Tumors ist ungefähr faustgross und liegt so nahe bei den genannten Magen- und Darmteilen, dass man den Eindruck bekommt, dass er ihre Senkung direkt verursacht oder zu derselben beiträgt.

Innerhalb des palpablen Tumors sieht man auf der Platte (siehe Fig. 2) erstens einen unregelmässigen, apfelgrossen Konkrement oder Knochenschatten mit einer zackigen und gefransten Kontur und einem perforierten Zentrum und zweitens ein mit diesem zusammenhängendes, zystenähnliches Gebilde von der Grösse einer Orange. Das letztere hat

lateral und unten eine gerundete, scharfe Kontur. Kephall fehlt eine deutliche Begrenzung. Hier geht der zystenähnliche, im grossen und ganzen homogene Tumorschatten ohne scharfe Grenze in den Leberschatten über. Durch seine Grösse und seine Lage teilweise vor der rechten Niere trägt er wahrscheinlich dazu bei, die letztere unsichtbar zu machen. Die linke Niere dagegen tritt deutlich hervor und zeigt nichts Bemerkenswertes. Das zystische Gebilde gibt einen bedeutend dichteren Schatten als die Niere.

Der früher erwähnte, apfelgrosse, zackige Knochenschatten liegt etwas rechts von der Mittellinie vor der Wirbelsäule. Bei Kompression mit der Zylinderblende wird derselbe mehr nach rechts verschoben. Innerhalb desselben zeichnen sich sowohl dichtere Züge und Balken, als auch dünnere Felder ab. Am weitesten kephal tritt innerhalb eines dünneren Ausläufers des kompakten Knochenschattens ein *bogenförmig gekrümmter Zahn* hervor, der in dieser Projektion am meisten an einen Eckzahn erinnert. Auch sein *Wurzelkanal* ist auf ein paar Platten sichtbar. Von dem dichten Knochentumor strahlen sehr undeutliche Platten und Spangen eine kurze Strecke weit in den zystenähnlichen, sonst homogenen Tumor ein.

Der ganze Tumor ist respiratorisch verschieblich, bei tiefer Atmung

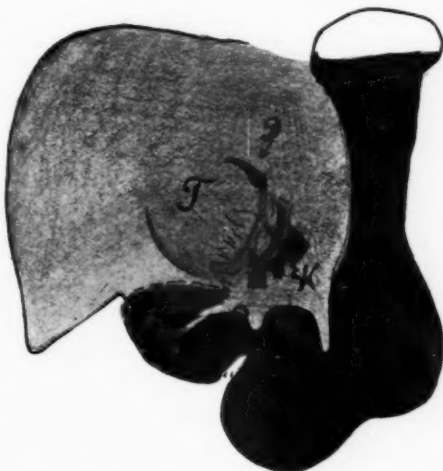


Fig. 1. K gibt den Knochentumor, D den Zahn und T die Zyste an.

um 1.5—1.75 cm. Er bewegt sich nahezu ebenso stark als die rechte Diaphragmakuppel. Die respiratorische Beweglichkeit der letzteren ist jedoch im Verhältnis zur linken Kuppel etwas gehemmt. Die linke Dia-

phragmakuppel verschiebt sich nämlich bei ruhiger Atmung in sitzender Stellung um 2.5 cm, die rechte dagegen nur um 1.5 cm. *Die Leber* zeigt normale Grösse und Form, ebenso *die Milz*.

Der *Canalis ventriculi* und die *Pars horizont. sup. duodeni* können vor dem Tumor frei verschoben werden. Bei gleichzeitiger Füllung des *Colon transversum* und des Magens mit Kontrastmasse und bei Untersuchung in Bauchlage legt sich der Magen oberhalb und das Colon unterhalb des Tumors; diese beiden Organe fassen also den Tumor zwischen sich.



Fig. 2. Spezialbild des Knochentumors. Der bogenförmig gekrümmte Zahn ist oben sichtbar. Die Pfeile geben die laterale Kontur der Zyste an.

*Die Lungen* und *das Herz* röntgenologisch normal.

*Diagnose:* Retroperitoneal gelegenes *Dermoid* oder *Teratom*.

*Operation* am 7./XI. (PETRÉN). *Teratoma retroperitoneale*.

Schnitt im Epigastrium, nach abwärts bis über den Nabel hinaus. Sobald die Ränder der Bauchwunde auseinander gehalten werden, stellt sich eine retroperitoneal gelegene, rundliche Vorbuchtung ein, an deren Vorderseite der ptotische Ventrikel und der bewegliche erste Duodenalabschnitt liegen, welche beide nach aufwärts und nach abwärts frei verschieblich sind. Der Kanalisteil des Magens kann beinahe bis zum oberen Rand des Tumors nach aufwärts verschoben werden. Das Colon transversum liegt seinem vorderen unteren Teile auf. Wenn der Ventrikel nach aufwärts verschoben wird, so buchtet der Tumor das ausgezogene Lig. gastrocolicum vor.

Der Tumor erstreckt sich nach aufwärts unter die Leber, die von normaler Grösse ist. Die Gallenblase dem Anscheine nach normal. Gallengang und Vena portae verlaufen in der Tiefe unter einem Peritonealblatt



gegen das Duodenum. Sie erscheinen länger als normal, wie wenn sie durch den ihnen dicht anliegenden Tumor ausgedehnt wären. Hinter dem rechten Teile des Tumors kann ein Finger 1—2 cm weit in das Foramen WINSLOWI eingeführt werden.

Um besser Raum zu bekommen, wird ein Querschnitt durch den rechten M. rectus gelegt. Nachdem der Tumor nun mit den beiden eingeführten Händen umfasst werden kann, lässt sich feststellen, dass er mehr als doppeltfaustgross ist und eine unregelmässig-rundliche Form hat. Er besitzt einen ovalen Ausläufer nach rechts. Er lässt sich im ganzen gegen die Bauchwunde zu nach vorne ziehen, ist aber sehr fest mit der hinteren Bauchwand verbunden, besonders links von der Wirbelsäule. Der sich nach rechts hin erstreckende Teil ist gegen die Tiefe zu weniger fixiert.

Wenn das Colon transversum in die Höhe gehoben wird, so sieht und fühlt man, dass die untere, konvexe Fläche des Tumors das Mesocolon transversum vorbuchtet. Innerhalb des Tumors kann eine Partie palpiert werden, die eine sehr feste, beinahe knochenharte Konsistenz hat.

Bei der Spaltung des Peritonealblattes oberhalb des Gallengangs findet man, dass dieser dem Tumor so dicht anliegt und mit ihm so fest zusammenhängt, dass er nur mit Schwierigkeit abgelöst werden kann. Die Serosalücke wird wieder geschlossen. Darauf wird der Magen nach aufwärts geschoben und der Tumor nach vorne gegen das Lig. gastrocolicum gedrückt. Letzteres wird durchtrennt, was die Öffnung der Bursa omentalis unmittelbar unterhalb des Magens zur Folge hat. Dabei kann man beobachten, dass die fibröse Tumorumwand mit den angrenzenden retroperitonealen Geweben dicht zusammenhängt. Es lässt sich keine Schicht finden, in der man den Tumor stumpf ausschälen könnte.

Das Pankreas ist mit seinem ganzen mittleren Teile oberhalb des Tumors situiert und liegt ihm dort dicht an. Die Vena mesenterica sup. verläuft gespannt, dick und blutgefüllt, über die rechte Seite der Vorderfläche des Tumors.

Man kann fühlen, dass der Tumor unterhalb des sichtbaren Teiles des Pankreas sehr dicht mit der hinteren Bauchwand verwachsen ist. Da eine Ausschälung technisch unmöglich zu sein schien, wurde zum Zwecke einer Ausräumung die recht dicke fibröse Wand des Tumors eingeschnitten. Dabei entleerte sich eine halbflüssige, dunkel gefärbte Masse von einem Aussehen, wie es bei Dermoiden gewöhnlich ist. In der Wand der Zyste konnte mit einem eingeführten Finger eine unregelmässige, kantige Knochenpartie von Eigrösse palpiert werden, welche in der Zystenwand zahlreiche dünne Knochenausläufer besass. Diese Knochenpartie wurde allmählich mit recht grosser Schwierigkeit herausluxiert, wobei die Gewebsteile, die sie mit der Innenseite der Zystenwand verbanden, abgebunden wurden. Dabei strömte fortwährend Dermoidinhalt aus; die Menge desselben betrug sicherlich 2—3 Trinkgläser.

Nachdem die Knochenpartie entfernt und Ligaturen gelegt worden waren, präsentiert sich der Tumor als ein zusammengefallener Sack, der an seiner Innenseite an einer Anzahl von Stellen kleine Zystenräume

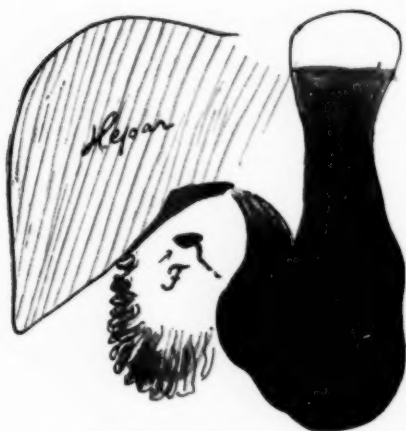


Fig. 3. F gibt die mit Kontrastmasse gefüllte Fistel an. Wenn man das vor der Operation genommene Bild (Fig. 1) mit diesem nach der Operation genommenen vergleicht, geht deutlich hervor, wie der Canalis ventriculi und der Bulbus duodeni durch den operativen Eingriff über den Tumorest, der als ein Gewebebalken von der hinteren zu der vorderen Bauchwand reicht, gehoben sind und im Stehen über denselben hängen.

und Gewebsetszen aufweist. Diese werden, soweit sich dies machen lässt, entfernt, und es bleibt eine reichlich orangengrosse Höhle innerhalb der Tumorkapsel übrig. Diese wird kräftig jodiert. Darauf wird die Tumorwand ringsum ein in die Tumorköhle eingelegtes Rohr an das Peritoneum parietale der vorderen Bauchwand angehängt. Die Bauchwand wird ringsum das Rohr geschlossen und ein Tampon wird eingelegt.

Die Heilung verlief in normaler Weise und 5 1/2 Wochen nach der Operation wurde die Patientin mit einer offenstehenden Fistel und einem eingelegten Drainrohr aus dem Krankenhaus entlassen. Die Patientin hatte jetzt keine Beschwerden nach dem Essen und fühlte sich recht wohl.

Der exstirpierte Teil des Tumors enthielt, wie die *pathologisch-anatomische Untersuchung* ergab, Talgdrü-

sen, Thyreoidea-, Nerven- und Gehirn- (?) Gewebe (QUENSEL). Der röntgenologisch beobachtete Zahn erwies sich als ein Bikuspis.

Am 14./I. 1922 kam die Patientin zurück, um sich einer *neuerlichen Röntgenuntersuchung* zu unterziehen. Die Fistel musste die ganze Zeit nach der Operation offen gehalten werden und sezernierte ständig eine geringe Menge schwach rot gefärbter Flüssigkeit. Wenn die Fistel einmal verschlossen wurde, traten Druckgefühl und Schmerzen in der Magengrube auf. Wenn die Fistel dagegen nach aussen sezernierte, so war die Patientin symptomfrei. Die Fistelöffnung lässt eben noch ein schmales Drainrohr passieren. Kein Ekzem an ihrer Mündung. Trypsinprobe im Fistelsekrete negativ.

Die Röntgenuntersuchung zeigte bei Füllung der Fistel mit Kontrastmasse, dass das Fistellumen sehr schmal, stellenweise nur so breit wie ein Zündholz war und von der äusseren, in der Mittellinie gelegenen Öffnung aus geradlinig nach hinten und gleichzeitig etwas nach rechts und oben gegen den Pankreaskopf zu verlief. An ihrem inneren Ende dicht am Pankreas zeigte die Fistel eine ungefähr kaffeebohngrosse Anschwellung.

Bei gleichzeitiger Kontrastuntersuchung des Ventrikels, des Duodenums und der Fistel (siehe Fig. 3) zeigte es sich, dass das Duodenum die Fistel bogenförmig umgab und dass der Bulbus duodeni und der Canalis ventriculi bei stehender Stellung der Patientin dem sehr dicken Gewebstrange aufruhten, der sich ringsum die Fistel zwischen der vorderen und der hinteren Bauchwand ausspannte und einen Rest des ursprünglichen Tumors darstellte. Dadurch, dass der Bulbus und der Canalis über diesem Gewebsbalken hingen, verursachte der letztere eine Impression an der Unterseite dieser Organe. Aus der Form und Grösse dieser Impression geht hervor, dass das Tumorgewebe eine Dicke von mehr als zwei Querfingern hat. Der C-förmige Bogen, den das Duodenum hier ringsum den Pankreaskopf und die Tumorreste bildet, ist grösser als unter normalen Verhältnissen. Da dazu noch kam, dass das Duodenum sich leicht seiner ganzen Länge nach füllen liess und lange Zeit gefüllt blieb, so erinnerten die erhaltenen Bilder in hohem Grade an eine chronische Pankreatitis mit Vergrösserung des Pankreaskopfes. Im vorliegenden Falle dürfte das Bild jedoch ausschliesslich durch das Vorkommen von Tumorresten in dieser Gegend erklärt werden können. Aber es wäre kaum verwunderlich, wenn hier wirklich infolge der nahen Nachbarschaft der Fistel eine chronische Entzündung des Pankreas vorläge. Bei Retention des Fistelsekretes bekam die Patientin, wie wir gehört haben, rasch Unbehagen und Schmerzen in der Magengrube. Die Fistel steht jedoch — nach der negativen Trypsinprobe zu schliessen — mit dem Pankreasgewebe nicht in Zusammenhang. Eine Untersuchung der Darmdigestion wurde nicht vorgenommen.

Durch einen Kontrasteinlauf wurde festgestellt, dass das Colon transversum unmittelbar unterhalb der Fistel lag. Durch Zusammenstellung der Röntgenbefunde — Verlauf des Fistelganges von der hinteren zur vorderen Bauchwand, Lage des Ventrikels oberhalb und des C. transversum unterhalb der Fistel — wäre es möglich, ohne Kenntnis des Operationsverfahrens eine Auffassung über dasselbe zu bekommen. Das Lig. gastrocolicum muss inzidiert und der Tumor muss auf diesem Wege entleert und an die vordere Bauchwand festgenäht worden sein.

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Der hier beschriebene Fall zeigt, welchen grossen Wert eine Röntgenuntersuchung für die Diagnose gewisser kongenitaler Geschwulstbildungen, besonders bei Gegenwart von abnormen Knochen- und Zahnanlagen haben kann. In diesem Falle zeichnete sich auf der Röntgenplatte ausser solchen abnormen Anlagen auch ein mit ihnen zusammenhängendes,

zystenähnliches Gebilde ab. Durch Füllung von in der Nähe liegenden Magen- und Darmteilen mit Kontrastmasse gab die Röntgenuntersuchung nach der Operation eine gute Vorstellung von der Grösse und Lage des zurückgelassenen Tumorstestes im Verhältnis zu den Organen in seiner nächsten Umgebung.

Die Zyste in der teratoiden Geschwulst verursachte einen dichteren Schatten als die Niere. Bei starkem Fett- und Cholestearingehalt des

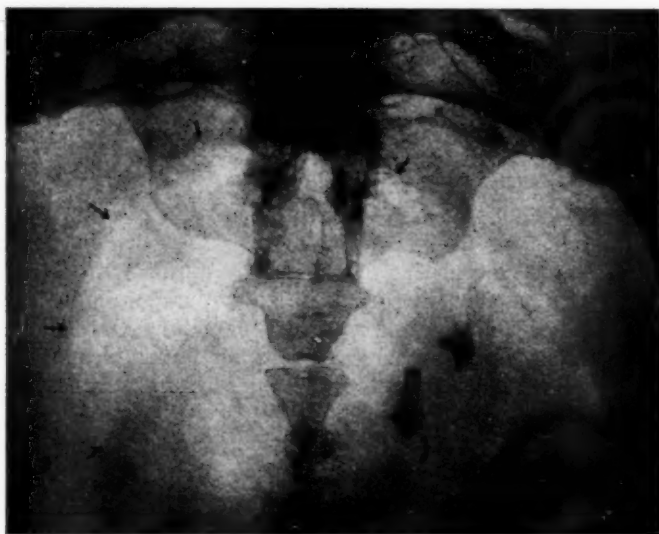


Fig. 4. Z: Zahn mit Wurzelkanal. Die Pfeile geben den vermuteten Dermoidschatten an.

Dermoidinhalts würde man möglicherweise ein umgekehrtes Verhältnis finden. So sieht man in JOSEPHSON'S Fall einen orangengrossen, gleichmässig runden, negativen Tumorschatten im kleinen Becken an der Stelle, wo die später exstirpierte Dermoidzyste sass (siehe Fig. 4).

Es dürfte jedoch hier nicht mit völliger Sicherheit behauptet werden können, dass der an dieser Stelle sichtbare Schatten wirklich der Dermoidzyste entspricht. Er könnte möglicherweise auch auf einer runden Gasansammlung im Rektum beruhen. Bei einigen von mir untersuchten Fällen von Ovarialdermoiden konnte kein deutlicher Schatten beobachtet werden, weder ein positiver noch ein negativer. Durch Füllung von in der Nachbarschaft des Tumors liegenden Organen, des Kolons und der Harnblase, mit Kontrastmasse oder event. mit Luft, hat man

bisweilen eine Möglichkeit, eine Auffassung über die Form, Grösse und Lage des Tumors auch in solchen Fällen zu bekommen, wo er sich nicht direkt auf der Platte abzeichnet. Durch Anlegung eines Pneumoperitoneums kann man in günstigen Fällen auch ein Bild des Tumors bekommen.

Wenn eine Dermoidzyste oder ein damit verwandter Tumor in der Brusthöhle liegt, so kann er sich, wie früher erwähnt wurde, mit einer scharfen, mehr oder weniger abgerundeten Kontur auf der Platte abzeichnen, wenn das Lungenparenchym der Umgebung deutlich luftführend ist.

\*

Als ein weiteres Beispiel von Knochen- und Zahnanlagen in gewissen Mischgeschwülsten soll hier in Kürze über einen Fall einer Dermoidzyste berichtet werden, der ebenfalls am Akademischen Krankenhause in Uppsala zur Untersuchung kam.

A. 378, 1915. Agnes R. 31 Jahre alt.

Seit ein paar Wochen Schmerzen im unteren Teile des Bauches. Früher keine ähnlichen Beschwerden.

Bei Palpation per vaginam fühlt man einen faustgrossen, gespannt fluktuierenden Tumor, der hinter dem virginellen Uterus gelegen ist und sich deutlich von diesem abgrenzen lässt. Er ist auf Druck fast vollkommen schmerzlos und bis zu einem gewissen Grade verschieblich.

*Operation am 23./VIII 1915 (EKEHORN).*

*Ovariectomie wegen Cysta dermoides ovarii dextri.* Der reichlich faustgrosse Tumor ging vom rechten Ovarium aus. Er war mit Haaren und Hautschmiere gefüllt und enthielt einen wohl ausgebildeten Eckzahn.

Das *Röntgenbild* (Fig. 5) der exstirpierten und entleerten Ovarialzyste zeigt einen vollkommen ausgebildeten Eckzahn, der in seiner Alveole sitzt. Der Wurzelkanal tritt deutlich hervor und scheint etwas weiter zu sein als normal.

Dieser Fall kam vor der Operation nicht zur Röntgenuntersuchung, da die Diagnose schon ohne eine solche klar zu sein schien. Wäre eine solche Untersuchung vorgenommen worden, so hätte die Dermoidzyste leicht auch röntgenologisch diagnostiziert werden können.

\*

Die oben von mir mitgeteilten beiden Fälle von Tumoren mit Knochen- und Zahnanlagen kamen, ebenso wie der früher von JOSEPHSON publizierte Fall, alle während der 5-Jahrsperiode 1914—1919 am Akademischen Krankenhause in Uppsala zur Untersuchung. Bei zweien von

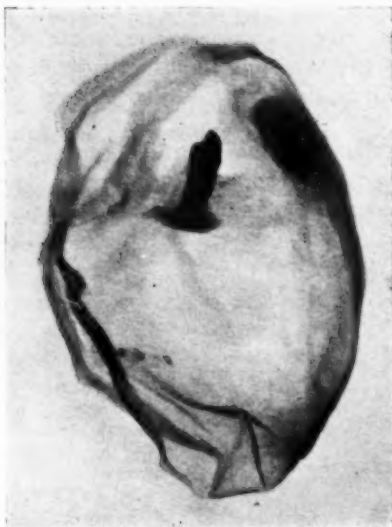


Fig. 5. Röntgenbild des exstirpierten Ovarialdermoids. Eckzahn mit Alveole. Deutlicher Wurzelkanal.

ihnen, wo es sich darum handelte, die Bedeutung eines palpablen Tumors zu entscheiden, war die Röntgenuntersuchung für die Diagnose Mischgeschwulst ausschlaggebend durch den Nachweis von Zähnen und Knochen. Doch treten vorhandene Zahnanlagen auf der Platte nicht immer so deutlich hervor, dass sie als solche identifiziert werden können, und dann wachsen die diagnostischen Schwierigkeiten. Die Zahnanlagen können weit entfernt von der Platte liegen und sich deshalb auf derselben unscharf zeichnen; die Unschärfe kann auch in einer technisch unbefriedigenden Aufnahme ihre Ursache haben. Die Zähne können so unentwickelt oder missbildet sein, dass sie trotz technisch gelungener Aufnahme nicht erkannt werden können. Die Zähne der Mischgeschwülste scheinen sogar in der Regel rudimentäre Formen zu

haben; mitunter fehlt das Email. Sowohl bleibende wie Milchzähne können vorhanden sein, bisweilen gleichzeitig, wie z. B. in dem Falle JOSEPHSONS. Die Zähne sind oft vereinzelt, können aber auch sehr massenhaft in allen Gattungen auftreten. Bis 300 sind angetroffen worden (PAGET).

Von Wichtigkeit ist es, sich zu erinnern, dass Zahn- und Knochenanlagen durch Röntgenuntersuchung bisweilen konstatiert werden können, ohne dass ein Tumor palpabel ist. Das ist natürlicherweise oft der Fall, wenn der Tumor klein ist und im Becken verborgen liegt. Ein makroskopischer Tumor kann sogar fehlen. So fand SAXER einen einzelnen Zahn im Ovarium eingebettet.

Die differentialdiagnostischen Schwierigkeiten, welche isolierte Zahnanlagen in Beckendermoiden gegenüber Uretersteinen er bieten können, werden durch die Fälle THURSTAN HOLLAND's und SONNTAG's exemplifiziert. Ihre Fehldiagnose zeigt, dass es von Wichtigkeit ist, auch an diese Geschwulstformen zu denken, wenn es sich darum handelt, die Art eines konkrementähnlichen Schattens zu entscheiden.



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## On the Roentgen Treatment of Brain Tumours\*

by

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I have in »Ugeskrift for Læger» in 1917, p. 771, 1918, pp. 331 and 829 and also in »Hospitalstidende» 1918, p. 559 etc. given a report of about 18 roentgen-treated cases of tumour cerebri, and later a summary of this in Strahlentherapie 1919, vol. IX, p. 631 and in the Journal de Radiologie, August, 1919, vol. III, No. 7, p. 314. The report in 1918 was brought forward as a lecture at a meeting of the Medical Association in Copenhagen <sup>22</sup>/<sub>1</sub> 1918 and came up for a discussion at the finish, which the »Hospitalstidende» reported in 1918, pp. 559, 621, 673; and later on Dr. A. NEEL took part in the discussion in »Ugeskrift for Læger» (1917, pp. 875, 964, 1146; — 1918, pp. 331, 489, 537, 587, 667, 829, 985, 1020, 1274, 1354; — 1920, pp. 867, 959, 1028).

The topic is so large that I shall not be in a position here to approach more especially the many questions and problems which have been raised from the neurological side. I must refer those particularly interested to the principal report in Hospitals tidende, 1918, and to the discussion which followed.

I shall here first report about the later progress of the earlier reported cases and add some new ones, and thereafter make a few general remarks. Of the 18 cases reported in Strahlentherapie it was announced that in 7 of these cases roentgen treatment was without effect or only partially effective, and they are no doubt all dead, (according to the report in Strahlentherapie 6 of them). In 2 cases the diagnosis was doubtful and the further development showed that it could scarcely be a tumour at all. Ultimately one case proved to be an extra cerebral, intracranial tumour at the base of the cranium from a sarcoma in the rhinopharynx. Time after time an apparently complete cure was here obtained with the disappearance of all symptoms, including the para-

\* Read at the II meeting of the Nordisk förening för medicinsk radiologi at Copenhagen. Sept. 1921.



lysis of the ocular muscles, — but quite as regularly the symptoms reappeared after some months and after rather more than a year the patient died.

After an expiration of 4 years at the very least, not more than half of the patients treated are still surviving, 9 in all, of which I shall render as brief an account as possible.

Of these No. 14 is, again, omitted owing to uncertain diagnosis. The diagnosis for this 31-year-old woman was tumour of the cerebellum. The röntgen treatment was followed by a slight improvement; she was operated on later at the Rigshospital and a cyst was found in the cerebellum. Professor ROVSING expressed in the abovementioned discussion the supposition that there had possibly been a tumour which, under the influence of the röntgen rays, had changed into a cyst, — taking into consideration that such are otherwise very rare in the cerebellum, — but I shall not express myself further about this.

*The 8 remaining cases are all still living after  $3\frac{1}{2}$  to  $6\frac{1}{2}$  years from date of treatment, essentially in the same condition as stated in the first report, and no recurrence has taken place.*

I can add to this a new case in which a cure was likewise effected, and has now lasted for  $2\frac{1}{2}$  years. (I have at my disposal several treated cases, but with less conspicuous results, and which I am obliged to pass over, owing to the shortness of time.

No 19: A 19-year-old countryman. For rather more than 2 months ago he contracted a concussion of the head through a fall from a bicycle, but not especially severe and without injury to the brain. 4 weeks ago his present attack began. Has lately been examined by an oculist who diagnosed tumour of the brain. Is quite incapable of doing work, mainly owing to headache, and keeps his bed for the most part. Vomiting without any apparent reason, slow pulse (48) and some giddiness. Double-sided papillœdema (3—4 Dioptr.) vision =  $\frac{4}{12}$  right eye  $\frac{4}{9}$  left eye, the visual field and condition of the pupil normal, likewise hearing and Barany-reactions. Negative W. R. in the blood and cerebrospinal fluid; in the lastnamed albumen 1—10, globulin 0, few cells. No focal symptoms whatever, neurological examination in other respects negative. Röntgen treatment  $\frac{15}{7}$ — $\frac{10}{7}$  1919 with 5 great fields (forehead, back of the neck, crown of the head, both temporal regions) with symmetry-inductor through 10 mm. aluminium at a distance of 24 cm à 1 H. E. D. Soon after sent home. On Aug. 8th he reported in a letter that he had become quite well. On Sept. 3rd he presented himself. There had been vomiting 3 times in all during the first week he had been at home, later on none at all. He said he was in a completely good state of health and that those around him judged him to be well, and that he had helped to unload rye and to get in the peat without inconvenience; he went hunting every day and he stated it was with good result. On ophtalmoscopic examination the papillœdema was not found to be essentially altered, but vision o. d.  $\frac{6}{12}$  o. s.  $\frac{6}{9}$ . There has been total epilation. A new growth of quite thin greyish-white hair is now beginning everywhere. On Oct. 10th, 1919, the ophtalmoscopic examination showed considerable improvement in the finding as there was only a little swelling in the papilla. In August, 1921, a good

2 years after the roentgen treatment, it was reported that he had just come home from a 9 months' curriculum at the Dalum Agricultural School from whence he had brought back the best testimonials. He had not been examined by any oculist since, but he himself thinks that his eyesight is just as good as before the disease.

In the valuation of radio-therapeutics for this extraordinarily serious and, so to speak, by every other treatment hopeless disease one meets with difficulties of quite a peculiar kind and which are hardly met with in any other röntgeno-therapeutic field, and it will never be possible in a single case to give a stringent logical proof that it really is a case of brain tumour cured by roentgen treatment. This condition we certainly find again elsewhere in radio-therapeutics. When a non-operated mammary tumour is cured by roentgen treatment, then the opponents can always say that it was not a carcinoma, although they will naturally acknowledge that it was a tumour. But when brain tumours are spoken of, the opponent can not only insist that the tumour was not malignant, but even that it was not a tumor at all, and, moreover, in no few cases he will be in the right. The reason for this does not lie in the radiology but in the imperfection of neurological diagnosis. When we send our patients for neurological examination and get them back again with the diagnosis: tumour cerebri, in the best cases also with a diagnosis more or less exactly localised, — then the neurologist always makes — and must make — the following reservation: The conception of tumour cerebri does not precisely and only mean in neurological language a tumour in the cerebrum, but something more. It means a localised, space-filling something of a different nature in the cranium, and it is, so to speak, never possible for the neurological diagnostician to decide if this something is a solitary tubercle, a cysticercus, a cyst, a meningitis serosa or a tumour, to say nothing of being able to state anything about the intimate nature of this tumour. The consequence of this is that among 20 patients, for instance, who are roentgen-treated for a »tumour cerebri», which has been diagnosed by the neurologist, there will *always* be a certain number — perhaps a really great number — of cysts, meningitis serosa and other diseases, besides a number of real tumours which do not respond to roentgen rays. Consequently, the percentage of cures of all treated cases must for this reason be considerably reduced beforehand. When, on the contrary, a cure is obtained by roentgen treatment, then it is a strong and probable proof that it really has been a tumour, as hardly any of the other diseases mentioned are affected by roentgen treatment, (just as little as, for instance, diseases of a syphilitical nature.) Through the good effects of the roentgen treatment the diagnosis of tumour can thus be placed »ex juvantibus», just as the diagnosis of syphilis through the good effects of the antiluetic remedies.

It seems to me to be substantiated through these cases that, in certain cases of brain tumour, a real cure may be obtained through roentgen treatment, and that this ought therefore to be tried in all cases.

Otherwise the only treatment which can be proposed is an operation; the results of this are very bad and primary mortality is high. As far as the cerebellum is concerned, there is no case known in Scandinavia where a cure has been obtained by operation, perhaps upon the whole no case. As far as brain tumours are concerned, there exists altogether up to date 1 Danish case of an intracerebral tumour (in corticalis) cured by operation. The roentgenologist must consequently be prepared that, among the encouraging cases, there will be many disappointments, many cases without effect, — either because it has turned out to be a cyst, or meningitis serosa, or a tumour that is not responsive to roentgen treatment, or because hopeless cases are referred to him and, finally, because there is not any tumour there at all, not even in an extended clinical = neurological sense.

This is all what I have to report to day about this question, taking the shortness of the time into consideration. Not every patient with tumour cerebri, who comes for roentgen treatment, will, as it is seen, be cured; and in the favourably influenced cases there will at times be surviving defects, corresponding to such more important centres or conductions which have been definitely destroyed by tumour. But it has been a great encouragement for me to have been able to report that the 8 cases originally recorded as having progressed favourably are still going on well up to date, so that it seems as if the brain tumours in this respect follow the sarcoma elsewhere, namely, that when the sarcoma has once disappeared, it has not then the great tendency to recur as cancer has, — (to be sure if the dose has been effective, »sarcoma dose«, and if the fields have covered everything). Nor is there any reason whatever that brain tumours should not offer just as good a field for radio-therapeutics as malignant tumours elsewhere, — particularly as they often seem to belong to those forms that are more responsive to radio-treatment.

### Summary

A report of 19 cases of clinically diagnosed tumour of the brain, treated by roentgen irradiation. Probably some of them have been cyst or meningitis serosa etc., not responding to irradiation. 9 of them seem to be cured (some of them with remaining defects as, for instance, hemianopsia) and are surviving, 1 of them 2½ years, the others from 3½ to 6 ½ years after treatment. Through the good effects of irradiation the diagnosis of brain tumour is confirmed.

## Results of Treatment of Surgical Tuberculosis with Carbon Arc-light Baths at Finsen's Light Institute from 1913 to 1921

by

*N. P. Ernst*

At the Finsen Medical Light Institute in Copenhagen, on the initiative of Doctor REYN, carbon arc-light baths have been employed since the autumn of 1913 for treatment of patients suffering from lupus or surgical tuberculosis, and on this subject Dr. REYN and I have issued a series of reports (Hosp. tid. 1914, Nos 43—44; Strahlentherapie 1916, vol. VI; Nordisk Kirurgisk Forening, Gothenburg 1916; Hosp. tid. 1917, Nos 19—20; Ugeskrift for Læger 1918 Nos 18—20; Strahlentherapie 1919, vol. X, and Discussions of Copenhagen Med. Society, October 1920).

So far as I can see, the literature on carbon arc-light baths with surgical tuberculosis is only very scarce. There is one report by SPITZER<sup>1</sup> who was head-surgeon at Lupusheilstätte in Vienna. He is extremely satisfied with the carbon arc-light bath in serious cases of lupus, but finds that with surgical tuberculosis it yields, if anything, less than the quartz lamp. He does not, however, produce any material, and his experiments extended over only six months, and if one dare rely upon the illustration which accompanies his article the patients are more than half dressed during the light bath, which of course is not the intention.

Dr. HEYERDAHL, of the Rikshospital in Christiania, refers in the Tidsskrift for den norske Lægeforening to the fact that he has used the carbon arc-light for treatment of surgical tuberculosis since 1913. He has only treated a very few cases, but he thinks the results very good.

From Denmark there is one report from Øresundshospitalet by VIGGO SCHMIDT,<sup>2</sup> who finds that pulmonary tuberculosis remains unchanged while surgical complications are favourably affected. Another report comes from TH. OLDENBURG,<sup>3</sup> who got favourable results with pulmonary tuber-

<sup>1</sup> Münch. med. Wochenschrift 1916, No. 44.

<sup>2</sup> Ugeskrift for Læger No. 4, p. 138, 1917.

<sup>3</sup> Reports from the National Society for combating tub. Copen. 1917 p. 53 (copied in U. f. L. 1917).

culosis in 14 out of 38 children, and obtained excellent results with 30 cases of surgical tuberculosis, of which 3 cases were otitis pelvis with abscess, 3 were cases of spondylitis with abscess, and 2 coxitis. As we know, he only treats children. He thinks that he observes the healing to be strikingly more rapid after puncture or incision of superficial abscesses.

I shall not enter upon the literature on the employment of the carbon arc-light bath with laryngeal tuberculosis and ear and nose affection (OVE STRANDBERG and N. RH. BLEGVAD), or with pulmonary tuberculosis (RUBOW & WÜRTZEN and W. HOLMBOE), but just mention a work by OVE STRANDBERG and K. A. HEIBERG<sup>1</sup> on the histological changes in the mucous membrane of the nose of lupus patients treated with light baths. They substantiated that these changes seen histologically are a genuine healing, qualitatively different from the feeble attempts at recovery which at times occur in the mucous membrane of the nose.

Even if the literature on carbon arc-light baths is somewhat scarce, yet it is certain that in Denmark, Norway, and Sweden the treatment is being employed to an increasing extent; and as a number of misunderstandings as regards *the technique* seems constantly to occur, this shall be briefly mentioned. But here I will remark that just the circumstance of the light-bath treatment demanding knowledge of and interest in a special technique makes the treatment, to my mind, less adapted to annexes associated with the existing hospitals and more adapted to be employed in a large hospital for the exclusive treatment of patients with surgical tuberculosis. Such an hospital, then, should naturally be placed at the coast, so as to benefit by the well-known favourable conditions of such a situation.

In order to obtain a good result from treatment with carbon arc-light baths it is necessary that the lamps burn steadily and in such a way that so much chemical light as possible is produced, and the Finsen Light Institute possesses a lamp with these qualities in the one which many years of experience and experiment has established as the best for the original Finsen treatment of lupus with concentrated light.

We employ large lamps of 75 amperes and small lamps of 20. They burn with a tension of 50—53 volt direct current, so that the tension from the street main must be reduced. Alternating current cannot be employed direct because the cone of rays which issues from the positive pole, with alternating current, comes by turns from the two carbon poles, while in order to obtain the full light effect on the body it is necessary for this to come continuously from the same direction, as is the case with the direct current lamp. Indirectly the alternating current can naturally be used as has been the case at the Light Institute since

<sup>1</sup> Acta radiologica, Vol. I.

the autumn of 1921. From the electric works is received an alternating current of 6,000 (six thousand) volt, which is reduced to 380 volt, driving an engine which transforms the alternating current into direct current of 70 volt. This current is then distributed to the lamps, a resistant being placed in front of each lamp for absorption of the superfluous tension. The lamps, which use 50—53 volt, only burn quietly and steadily when there is a small surplus of tension in the current conducted.

In order to obtain a powerful chemical light it is important that the carbons of the lamps are as thin as possible for the lamp concerned (the positive carbon which is placed highest is the largest), and further that the carbons are correctly adjusted, so that the lamp burns with a white light and does not every moment emit a red sooty flame. The lamps must not burn in series, as experience has shown that they then burn less steadily, and when one lamp in the series goes out of action the others also stop.

We use the large lamps (75 ampères) with patients who are well enough to sit up, placing 8 sitting patients round two lamps, at a distance of about 1 metre; this distance must not be lessened, on account of the great heat which radiates from the lamp; nor must it be increased, because the effect of the light diminishes with the quadrate of the distance. We use the small lamps (20 ampères) with patients who are either too weak to sit up or on account of the localization of their affection are unable to do so, and then 3 lamps hang between 2 couches, so that 2 reclining patients can receive the light simultaneously.

The patients, who are quite naked, but provided with large black spectacles or shades to protect their eyes, first turn their backs and then their chests or sides towards the lamps, so that by degrees they are irradiated from all sides.

Those patients who have open wounds wear no dressings during the light bath. If the wounds are badly secerning (the light bath often produces strong secretion) the secretion is absorbed with the help of cell matter. I see absolutely no reason to cover the wounds during the light bath, and to do so is contrary to the historical development of this, because what has led the sun- and light treatment into its present brilliant course is BERNHARD's therapeutic experiments and, as is well known, he irradiated only the diseased region (with sun rays) and it was the favourable results obtained by him in this manner which gave ROLLIER his idea for the general sun treatment with irradiation of the whole body. Here I may remark that the first patient treated by BERNHARD did not suffer from tuberculosis at all, but from cut-wounds. If I again emphasize this it is to encourage surgeons who have light-bath



installation to employ light-baths with infected non-tuberculous wounds, something we have had no opportunity of doing at the Finsen Light Institute.

As regards the duration of the individual light-bath we begin with 30—45 minutes, generally increasing this by 30 minutes at a time, so that the patient quickly reaches the full  $2\frac{1}{2}$  hours (the stated hours do not hold good at all with the quartz lamp). During the first years we almost always gave light baths daily, but of later years, by reason of lack of space, we have generally given them on alternate days. In my opinion the goal is reached more quickly by giving light baths daily, so long as the patient does not become too tired or slack with this rather fatiguing treatment.

Besides the general light bath we employ to a great extent the genuine Finsen treatment with superficial wounds and fistulas, in the same way as it is used with lupus, i. e. the electric light from an arc lamp of 50 amp. concentrated through an apparatus with convergent lenses which must be made of quartz and not of glass, as the glass absorbs far more of the chemical rays than the quartz does. I think that this local treatment is of great importance with superficial soft wounds and fistulas which — as experience at the Institute shows — are in many cases the outlet for cutaneous tuberculosis and lupus.

Even if in many, indeed most, cases we use light baths as the sole treatment for surgical tuberculosis, we by no means reject the old recognized conservative surgical, orthopaedical methods of treatment. We puncture abscesses which will not disappear and inject iodoform-glycerine; superficial abscesses which will not disappear when punctured we incise and scrape out the soft parts with a sharp curette, treating with phenol and spirits (adm. PHELPS), but only reluctantly touching the bones unless they already have been scraped out before the patients come under our treatment. In which case a sequestrum is often found, which we remove, contrary to ROLLIER who awaits its spontaneous expulsion. While this applies to the superficial abscesses, we take good care not to incise the deep-lying, afebrile congestion abscess originating from spondylitis, osteitis pelvis, or coxitis. Here we confine ourselves to the puncture and iodoform injection, and if in this case perforation occurs through one of the puncture openings we ease the depletion of the pus by suction with a BIER-KLAPP »balloon», and take extreme care to carry out a sterile dressing, which naturally is difficult with the ambulant patients.

We treat wounds and fistulas almost always with lapis cauterization every second day. As the lapis pencil would be too dangerous an infection carrier we use lapis solution 33 %, which is applied with a little pad of cotton-wool, of which about 50 are sterilized in a roomy

glass tube which is closed at both ends with wads of cotton-wool. In my opinion this energetic lapis cauterization is of great use with tuberculous wounds, whether originating in a bone affection or tuberculous lymphoma.

We by no means employ bandaging of the diseased joint in every instance, but only to alleviate pain and to prevent deviations and we prefer to use removable bandages which can be shifted during the light bath. Of later years, however, I have been more inclined to use bandages with tuberculosis of the knee-joint, because in some cases which were treated without bandages flexion contraction and later subluxation resulted. For bandaging the knee we have employed circular plaster-of-Paris, which proved to hold better during the light treatment than we had expected.

We have in many cases successfully counteracted pes equinus with elastic pulls which start from a wooden splint under planta and reach a girth above the knee. So soon as the pains in the diseased articulation have disappeared, and we no longer fear deviation in the attacked joint, we have encouraged the patient to make slight active movements of the joint without subjecting the diseased extremity to any heavy work, nor have we allowed patients with affection in one of the large joints of the lower extremities to support himself on these too soon, unless, forced by the conditions of space, we have had to treat the patients as ambulant.

I have not been able to substantiate any certain prophylactic effect of the light-bath treatment; on the contrary, I have often observed with patients having light baths that abscesses (tuberculous) have formed on places where nothing abnormal had been noticed before, and I have also once or twice observed fresh cases of tuberculosis of the joints appear with patients who were having light baths.

In order to obtain favourable results from treatment of surgical tuberculosis with light-baths it is, as with any treatment, *of the utmost importance to get the patient under early treatment*, and this is especially the case when it is a question of getting a good functional result with an affection which has attacked bones or joints.

Here I must emphasize the well-known fact that the *diagnosis* of tuberculosis of the joints is first and foremost a *clinical one*. If, based on the anamnesis and the clinical examination, one has established the diagnosis tuberculosis, then this cannot be abrogated because the roentgen picture shows normal conditions. Unfortunately, this is a widely disseminated false apprehension, which has been the cause of many cases of tuberculosis of the joints being treated with massage or *Brisement forcé*. While with incipient bone and joint tuberculosis, therefore, one very



often obtains normal roentgen pictures, I have repeatedly observed and often previously emphasized that at a moment when, clinically seen, the affection is improving or almost healed a distinct destruction of the bone tissue can be substantiated, and this destruction disappears much more slowly than the clinical symptoms, and suggests constant caution.

I shall now proceed to go over the tables and add a few remarks to the figures stated. The patients accounted for on these tables have all been treated with carbon arc-light.

The figures stated in the first column are the number of the cases, and one cannot ascertain the number of the patients by adding up these figures, because many patients are entered as suffering from 2 or more diseases, so when a patient has two localizations of tuberculosis, in the wrist and the epididymis for example, I should diminish my statistics for one of these diseases by entering the patient under only one indication.

The percentage of cures given receives increased value from a fairly large number of controlled cases, a number of these having been observed for more than three years; but naturally this figure cannot be so large with such a young method.

Under the heading of free movement I have reckoned movement which is at most  $25^{\circ}$  under normal (the measures being taken with goniometre).

The number of uncomplicated cases is 158 with 145 patients. The number of complicated cases is 396 with 294 patients; total 554 cases with 439 patients.

### *Spina ventosa* (uncomplicated cases)

Here we have 22 patients with at least 35 bones attacked by spina ventosa.

Of these, 5 patients were over 15 years, only one case having lasted longer than 12 months before the light-baths commenced, and in only 1 case did an abscess form, which was incised. After which it quickly healed. The duration of the treatment in a few light cases was 2 to 3 months, with light baths every second day at the most. Only in a few serious cases has the treatment extended over six months. All 22 patients were cured, 21 being controlled later, 8 for more than 3 years and 8 for more than 1 year after the conclusion of the treatment. The remaining 5 for less than 1 year. In no case was there any relapse.

### History I

Rosa Ohm, 17 months old. Copenhagen.

*Multiple spina ventosa.*

The disease had been observed for 1 month when she was admitted to the Institute.

## Closed non-complicated cases

|                        | Number | Over 15 years | Duration beyond 6 months before light bath | Changes in roentgen picture | Recovered     |                  |                  |          |           | Died under treatment | Treatment broken off | Controlled |             |              |          | Cured later |
|------------------------|--------|---------------|--|-----------------------------|---------------|------------------|------------------|----------|-----------|----------------------|----------------------|------------|-------------|--------------|----------|-------------|
|                        |        |               |  |                             | Free movement | Partial movement | Without movement | Improved | Unchanged |                      |                      | Total      | Over 1 year | Over 3 years | Relapses |             |
| Spina ventosa .....    | 22     | 5             | 1  | 20                          | 22            | —                | —                | —        | —         | —                    | —                    | 21         | 8           | 8            | —        | —           |
| Arthritoid carpi ..... | 23     | 19            | 19   | 21                          | 16            | 3                | —                | 2        | 1         | —                    | 1                    | 21         | 8           | 13           | 1        | 1           |
| " cubiti .....         | 17     | 12            | 9  | 16                          | 9             | 4                | 2                | —        | 2         | —                    | —                    | 14         | 7           | 5            | —        | —           |
| " humeri .....         | 7      | 7             | 5  | 6                           | 3             | 2                | 2                | —        | —         | —                    | —                    | 7          | 5           | 2            | —        | —           |
| " pedis .....          | 14     | 8             | 10   | 9                           | 9             | 1                | 4                | —        | —         | —                    | —                    | 13         | 7           | 3            | —        | —           |
| " genus .....          | 42     | 28            | 34   | 24                          | 15            | 7                | 5                | 2        | 8         | 1                    | 4                    | 29         | 10          | 11           | 5        | 1           |
| " coxae .....          | 7      | 2             | 3  | 5                           | 1             | 1                | 3                | —        | —         | —                    | 2                    | 5          | 1           | 3            | 1        | —           |
| Spondylitis .....      | 7      | 5             | 4  | 4                           | 4             | —                | —                | 1        | —         | —                    | 2                    | 4          | 4           | —            | —        | —           |
| Tendosynovitis .....   | 8      | 7             | 6  | —                           | 1             | —                | —                | —        | 7         | —                    | —                    | —          | —           | —            | —        | —           |
| Peritonitis .....      | 8      | 4             | 5  | —                           | 6             | —                | —                | —        | —         | —                    | —                    | 6          | 1           | 3            | 1        | —           |
| Genit. virilia .....   | 3      | 3             | —  | —                           | 2             | —                | —                | —        | 1         | —                    | —                    | 2          | 1           | 1            | —        | —           |

## Cases complicated with fistula or abscess

|                              | Number | Over 15 years | Disease beyond 6 months before light bath | Changes in roentgen picture | Recovered     |                  |                  |          |           | Died under treatment | Treatment broken off | Controlled |             |              |          | Healed later |
|------------------------------|--------|---------------|---|-----------------------------|---------------|------------------|------------------|----------|-----------|----------------------|----------------------|------------|-------------|--------------|----------|--------------|
|                              |        |               |   |                             | Free movement | Partial movement | Without movement | Improved | Unchanged |                      |                      | Total      | Over 1 year | Over 3 years | Relapses |              |
| Spina Ventosa .....          | 56     | 21            | 29  | 47                          | 41            | 5                | 3                | —        | —         | 1                    | 6                    | 9          | 26          | 14           | 4        | 2            |
| Arthritoid carpi .....       | 24     | 22            | 21  | 21                          | 6             | 12               | 1                | 1        | 1         | —                    | 3                    | 18         | 9           | 2            | 1        | 1            |
| " cubiti .....               | 31     | 23            | 23  | 24                          | 10            | 17               | 3                | —        | 1         | —                    | —                    | 22         | 13          | 6            | 5        | 4            |
| " humeri .....               | 8      | 6             | 8   | 8                           | 1             | 4                | 2                | —        | 1         | —                    | —                    | 6          | 2           | 1            | 2        | 2            |
| " pedis .....                | 33     | 26            | 30  | 29                          | 14            | 12               | 2                | 2        | —         | 2                    | 1                    | 30         | 14          | 11           | 1        | —            |
| " genus .....                | 14     | 11            | 14  | 12                          | 1             | 1                | 7                | 2        | 2         | —                    | 1                    | 9          | 3           | 6            | 2        | —            |
| " coxae .....                | 15     | 12            | 15  | 10                          | —             | 4                | 4                | —        | 5         | 1                    | 1                    | 8          | 2           | 4            | 2        | —            |
| Caries costae & sterni ..... | 32     | 29            | 24  | 4                           | 23            | —                | —                | 5        | —         | —                    | 4                    | 23         | 11          | 6            | 4        | —            |
| Ostitis (60 pats.) .....     | 73     | 47            | 62  | 38                          | 68            | —                | —                | 2        | 1         | 1                    | 1                    | 68         | 41          | 13           | 2        | 2            |
| " pelvis .....               | 11     | 8             | 10  | 5                           | 6             | —                | —                | 3        | 2         | —                    | —                    | 6          | 1           | 2            | —        | —            |
| Spondylitis .....            | 20     | 16            | 16  | 5                           | 11            | —                | —                | 1        | 3         | 3                    | 2                    | 11         | 7           | 2            | 1        | —            |
| Tuberc. subcut. ....         | 42     | 30            | 23  | —                           | 37            | —                | —                | 2        | 1         | —                    | 2                    | 36         | 26          | 7            | —        | —            |
| Tendosynovitis .....         | 8      | 7             | 8   | —                           | 7             | —                | —                | —        | —         | —                    | 1                    | 5          | 3           | —            | —        | —            |
| Peritonitis .....            | 7      | 2             | 7   | —                           | 4             | —                | —                | 1        | 2         | —                    | —                    | 4          | 3           | 1            | —        | —            |
| Genit. muliebr. ....         | 6      | 6             | 6   | —                           | 4             | —                | —                | 2        | —         | —                    | —                    | 6          | 2           | 3            | 2        | 1            |
| Genit. virilia .....         | 16     | 16            | 11  | —                           | 12            | —                | —                | 2        | —         | —                    | 2                    | 12         | 6           | 4            | —        | —            |

Clinically 6 bones on her hands were found to be attacked by spina ventosa, but at the roentgen examination 5 further bones were found to be attacked. She was treated with light baths every alternate day from  $16\frac{1}{4}$  1915 till  $1\frac{1}{2}$  1916 (92 light baths). On May 12 an abscess on 5th right finger was incised. On August 25 the wound had almost healed, and hardly any swelling of the bones could be proved. On  $7\frac{1}{6}$  1916 the roentgen picture showed normal conditions, and when on Oct. 19, 1920, she was demonstrated in Med. Selskab both hands were completely in order.

### *Spina ventosa* (complicated cases)

56 patients were treated, having altogether 73 bones attacked by sp. ventosa.

Of these patients 21 were over 15 years, 29 having been ill more than six months before they began the light baths, and of these again several were 4 and 5 up to 13 years. Various surgical interventions had been made on a number, and some had been to hospitals at the coast, even for several years. With 47 of the patients there were changes in the roentgen picture. With 3 no changes, and 7 were not radiographed.

The duration of the treatment, as with the uncomplicated cases, has in a few favourable cases been 2—3—4 months, with light baths every alternate day at most. In severe cases it has been considerably longer, and this especially applies to the patients who before the light-bath treatment had been subjected to energetic surgical interventions, such as scraping out of the bone or osteoplasty. In such cases the treatment might extend over 12 months.

49 of the patients were cured, and of these 41 with free movement in the articulation adjoining the diseased bone, 5 with partial movement, and 3 without movement. One patient, a man 69 years of age, died from pneumonia under the treatment, and 6 broke off the treatment. The 49 cured are all controlled, 26 for over 12 months and 14 for over 3 years after the conclusion of the treatment. In 4 cases there had been relapse, and of these 3 had been treated operatively elsewhere before the light-bath treatment commenced. Two of the relapsed recovered during renewed light treatment. 1 patient (child 12 months) died from meningitis 1 year after the conclusion of the treatment, and 1 patient (young man of 20) died of acute tuberculosis of the lungs a few weeks after the conclusion of the treatment.

### History II

K. J. Boy, 9 years old, Copenhagen.

*Spina ventosa, fist. metacarpi I utr.*

4  $\frac{1}{2}$  years before admittance to the Institute osseous affection of the first metacarpus of both hands had set in. Was twice operated on at a Copenhagen hospital, on each

hand, was then sent to a coast hospital where he spent 2 years. Has never been quite healed. Irregular, plump swelling of both I ossa metacarpalia and strongly secerning fistulas. \* At the *roentgen examination* considerable osseous changes were found.

He had light-baths from  $21/6$  1915— $22/3$  1916, 161 light baths in all. On July 28, 1915, the left hand was healed, and has remained so since. On Nov. 5 the right hand was also healed, but here a relapse occurred in the summer of 1918, which, partly on account of the patient's neglect in attending the light baths, was not successfully healed until June, 1920, but since then it has remained healed.

### History III

Aase M. J. was admitted to the Institute  $16/3$  1917, 10 months old.

When 4  $1/2$  months old osseous affection of v. r. metacarp. set in; later several other tuberculous affections supervened, so that on arrival at the institute she was suffering from the following tuberculous affections: *Ostitis frontis c. absc.* *Arthr. cubiti dext. c. absc.* *Spina vent. fist. metacarpi V dext. et metacarpi I sin.* *Absc. frigidus pedis.* *d. Lymph. supp. reg. crur. dext.* She had light baths from  $17/3$  1917— $10/5$  1918, 214 light baths in all. A small sequestrum from a fistula on the back of the right hand was ejected on  $4/7$  1917. Both hands were healed  $20/12$  1917. The other affections also healed, though the right elbow only after incision, and on the conclusion of the treatment an insignificant fistula was still found on the elbow. No trace since conclusion of treatment.

### Wrists (uncomplicated cases)

We treated 23 patients, of whom 19 were over 15 years old; with 19 the disease had existed for more than 6 months before they came to the institute, and with 21 the morbid process in the bones could be proved by roentgen examination. Of the 23 patients 16 were cured with at most  $20^\circ$  restriction of the movements, with 12 of these the wrist became perfectly natural in appearance and motility. Of these 12 there were changes in the roentgen picture with eleven, and 9 of the 12 had been ill for more than 6 months before they came to the Institute. 7 of the 12 patients had been controlled for more than 3 years after the conclusion of the treatment. Several of these patients are occupied with land work, and two are keen piano or organ players. 3 patients recovered with restricted motility, of these two had been ill for 4 years before coming to the Institute. 2 patients who had been ill for 2 years were relieved of pain but had stiff wrist; the one of these died 3 years later of spondylitis. One patient remained unchanged, having suffered for 30 years, and one patient broke off the treatment after 19 light baths.

All the 21 recovered and improved were controlled, 8 for 12 months and 13 for more than 3 years after the conclusion of the treatment.

One patient who had extensive affection in carpus had a relapse (osseous disease at the base of metacarpus II) two years after conclusion of treatment; she is now well again after renewed light-bath treatment.

With 7 patients the duration of the treatment has been 6 months or less, only with 2 patients has the treatment extended over 12 months, apart from those cases where other tub. diseases indicated continued light baths.

It was not necessary to operate on any of the patients treated.

#### History IV

Emma M. 31 years old, country teacher, Jutland.

*Arthr. tub. carpi. sin.*

For 12 months closed tub. of left wrist; began after sprain. Referred to the Institute in March, 1915. For 5 weeks before this she had worn a plaster of Paris bandage. Characteristic swelling of left wrist. Severe restriction of all movements and great pain in trying to overcome resistance, but no pain when in peaceful position; atrophy of muscles of hand and forearm.

*Roentgen picture* showed characteristic changes of the base of metacarpus II, III, IV, and the adjoining bones in carpus.

Light baths daily from  $29/3$  15 till  $28/8$  15, 105 baths in all, and from  $29/12$  15 till  $12/1$  16, 11 baths.  $25/8$  15 treated without immobilization. No apparent difference in the two wrists. Still slight atrophy of musculature of left forearm, and inconsiderable soreness of left wrist; motility nearly normal. July 1916, left wrist natural in appearance and function; plays the organ. Sept. 1920: still all in order, and has attended two months' course of music lessons, and during this time played the piano several hours daily without any inconvenience.

#### History V

J. B. a barber's daughter. Copenhagen.

*Arthr. tub. carpi. sin. Lupus antibrachii sin.*

When 12 years old treated at the Institute from 1905 for lupus vulgaris on left antibrachium. In 1907 rather severe swelling of left wrist was noticed. During the following years her condition deteriorated, and in Dec. 1912 was noted: There are pains and severe swelling of left wrist, and *roentgen picture* shows affection of lower end of radius. In March, 1916, the *roentgen picture* showed increased destruction in radius, extending right down to the joint-line, and there was swelling round the wrist and greatly restricted motility, as the outstroke volar-dorsally was only  $30^\circ$ , and ulnar-radially only  $20^\circ$ .

Light baths  $26/4$  16— $1/3$  17, in all 164 baths. On  $24/5$  16: Abscess has formed corresp. to capit. ulnae sin.; incision with emptying out of gritty pus; not until  $8/12$  had incision healed; motility quickly improved in the course of the autumn 1916. In May, 1917, is noted: Absolutely no inconvenience in left hand, which resembles the right in appearance and motility, with the exception of the volar flexion being slightly restricted. Plays the piano. *Roentgen picture* on  $13/2$  20 showed that the process in lower end of left radius was completely healed, with some osteophyte formation. Oct. 1920: left hand completely in order in appearance, motility, and strength.

*Wrist (complicated cases)*

In all 24 patients were treated. Of these 22 were over 15 years of age, and 21 of them had been ill for more than six months before the light-bath treatment commenced. Of the patients 3 had been resected. During the light-bath treatment incision and évidement were made in 7 cases, and partial resection in 1.

Radiography showed osseous changes with all patients radiographed (21) as 3 were not radiographed. Three patients broke off the treatment before completion. Of the 21 patients 19 must be reckoned cured, and of these again 6 attained complete free motility. With 5 of these 6, changes were revealed in the roentgen picture, and with three of them there had been puncture of abscess, and with one incision of abscess, during the light-bath treatment. 12 of the 19 recovered with some motility, and one without motility, the latter being a man who had suffered from tuberculosis of the wrist for 16 years. One patient who, in addition suffered from tuberculosis of the lungs and syphilis, improved only to die a year later of his lung complaint. One patient with whom resection had been made before the light treatment was not influenced, and finally amputatio antebrachii had to be performed.

(Here we must add the case of a man of 60 who, at the time when this work was being prepared, gave up the treatment and insisted on his arm being amputated.)

3 patients broke off the treatment. 18 patients were controlled later. 9 for more than 12 months and 2 for more than 3 years after conclusion of treatment; relapse occurred with only one patient, after treatment. He was again treated with light, and has now been well for more than 2 years, carrying out his work as a hospital porter.

In no case has the treatment lasted less than 6 months; in a number of cases for between 6 months and 1 year, and in some cases for between 18 months and 2 years.

**History VI**

Vera S. 10 years old, Copenhagen.

*Arthr. tub. carpi dext. c. abs.*

In 1914 operated on for osseous affection in right crus simultaneously with an affection in right wrist which was treated with plaster of Paris bandage; good health till Jan. 1917, when swelling of right wrist and up right forearm again appeared. Entered Institute  $\frac{23}{3}$  17, where we found swelling and greatly restricted motility of right wrist, 20<sup>c</sup> outstroke volar-dorsally, inferior side motility as also fluct. on the dorsal side of lower part of antibrachium. *Roentgen picture* revealed immense central illumination in the lower end of right radius, and affection of adjoining bones of carpus, of which os naviculare was partly destroyed. Light baths  $\frac{3}{4}$  17



— $^{14}/_{11}$  17, in all 141 light baths. On  $^9/_5$  17 puncture of abscess with injection of 2 ccm. iodoform glyc. On  $^1/_8$  17 abscess disappeared.  $^{14}/_{11}$  17: continuous inspissation of lower end of radius, motility only slightly restricted.  $^{27}/_3$  18 uses her hand.  $^3/_4$  18 *Roentgen picture* shows that the great central illumination in lower end of radius is almost entirely vanished. There is complete synostosis between radius and os navic. and os lunatum.  $^8/_4$  21: no inconveniences from right hand, which appears natural; volar flexion  $75^\circ$ , dorsal fl.  $30^\circ$  with simultaneous radial deviations, radial fl.  $45^\circ$ , ulnar fl.  $10^\circ$ ; handshake vigorous.

### History VII

Johanne J. D. 27 years old, music teacher, country, Jutland.

*Arthr. tub. carpi sin. c. abscess.*

Since 1906 has had inflammation of the lungs, and has visited sanatoriums several times. In March, 1918, tender swelling came round the radial side of left wrist; treated with iodine painting and plaster of Paris bandage. Entered Finsen Institute in June, 1918. There was then a good deal of swelling round the entire left wrist, mostly on the radial side where an abscess half the size of a hen's egg was found. The hand is fixed straight in an outstretched position, with a radial deviation of  $20^\circ$ . The wrist can, however, be volar inflected  $40^\circ$ ; side movements quite stopped; movement of fingers partly restricted; the thumb can only be opposed to 2 and 3 pulpa. *Roentgen picture* on  $^3/_6$  18 showed considerable periosteal inspissation of lower end of radius, the surface of the joint of this being uneven, while there is patchy atrophy in all the bones of the carpus. Furthermore, the patient had fistulous tub. lymphomas on the neck and double pulmonary tuberculosis with T. B. in the expectation. She was treated with light baths every alternate day from  $^5/_6$  18— $^{18}/_9$  18, and from  $^{11}/_{12}$  18— $^{21}/_2$  19, in all 63 light baths. The 3 months interruption in the autumn 1918 was due to the influenza epidemic;  $^{11}/_6$  18 abscess punctured, emptying out 6 ccm. pus and gritty substance. 8 days later an ulceration formed on place of puncture.

On  $^8/_1$  19 the wound at the wrist was healed, and  $^{12}/_3$  19 is noted: almost entirely free motility in left wrist; abduction gives only slight pain.  $^{25}/_8$  20 presents herself, works with her hand without any inconvenience; plays piano a good deal as teacher. At inspection not the slightest swelling of the hand is seen. Cicatrix on radius nice; motility completely normal and quite as extensive as on right side. The neck quite smoothly healed, without swelling of the glands. *Roentgen picture*  $^{26}/_8$  20 showed smoothing-out of extr. inf. radii; the periosteal swelling quite vanished; and further improved structure, which now may be considered the nearest approach to being completely natural.

### Elbow (uncomplicated cases)

17 patients were treated. Of these 12 were over 15 years, 9 had been ill for more than 6 months before the light-bath treatment, and 4 of them for more than 5 years. With 16 out of the 17 changes were proved in the roentgen picture 15 of the patients were cured, 9 of whom with completely free motility (that is  $20^\circ$  deficiency at most), 4 with partial motility and 2 without. Of these 2 one had been ill for 8 years and the other for 2 years before the light-bath treatment com-

menced, and both had been treated with plaster of Paris bandage. 2 patients remained unchanged, one of whom had been ill for 12 months before our treatment began, and the other for five years; both had been treated with plaster of Paris bandage. Of the 15 cured 14 had been controlled, 7 for more than 12 months and 5 more than 3 years after completion of treatment. In no case was relapse proved. In a couple of cases the treatment lasted less than 6 months, and only in 2 cases more than 12 months. One patient died from tuberculosis of the lungs 2½ years after conclusion of treatment.

### History VIII

Richard J. 14 years old, apprentice to Smith, Copenhagen.

*Arthr. tub. cubiti dext.*

From June 1915 swelling and restricted motility of right elbow. Applied in August to out-patient department of hospital in Copenhagen. With *Roentgen picture* at the hospital was found: ulna's joint-line jagged, irregular; a small elucidation in emin. capit.; plaster of Paris bandage applied at out-patient department.

<sup>8</sup>/<sub>10</sub> 15 referred to Finsen Institute where he was treated daily with light baths from <sup>6</sup>/<sub>11</sub> 15—<sup>10</sup>/<sub>5</sub> 16 and every alternate day from <sup>18</sup>/<sub>5</sub> 16—<sup>15</sup>/<sub>8</sub> 16; in all 186 light baths. <sup>21</sup>/<sub>11</sub> 15 flexion was 70°, extension 115°. <sup>15</sup>/<sub>12</sub> sep. splint which he wore so long on account of ambulant treatment, <sup>23</sup>/<sub>3</sub> 16 sep. Mitella, <sup>26</sup>/<sub>4</sub> 16 may use the arm.

July, 1916, no pains or tenderness. Contours of right elbow natural. Flexion 65°, extension 140°.

March, 1921, no swelling or tenderness of right elbow joint. No swelling of cubital gl. Flexion 60°, extension 140°, rotation free. Works in a store-house.

### Elbow (complicated cases)

31 patients have been treated, of whom 23 were over 15 years. 23 had been ill for more than 6 months before light-bath treatment commenced. Roent. picture showed osseous changes, with 24, and 4 pats. were not radiographed. With 4 resection had been done before the light-bath treatment commenced. During the light-bath treatment incision of abscess was made in 7 cases, and resection in 2. With one of these patients, a lady 63 years of age, we obtained active flexion at 70°, active extension at 165°, and normal pronation and supination in half extension. Of 31 patients 30 recovered, 10 of whom with free motility (at most 20° deficit); 17 with some motility, and 3 without. Of these one had been ill for 16 years, and 1 for 4 years. One patient remained unchanged. The latter was a man from Sleswic, who, during the war, was treated here and died later of tuberculosis of the lungs.

22 of the patients cured have been controlled, 6 for more than 3 years, and 13 for over 12 months after conclusion of treatment. Relapse



occurred in 5 cases; in 2 cases an abscess which quickly healed; 2 patients were cured by a new light treatment, and one patient is still under treatment at the Institute, for relapse, with promising prospect. Besides the abovementioned man from Sleswic yet another patient has died from tuberculosis of the lungs.

In 4 cases the treatment lasted about 3 months, in 3 cases about 6 months, and in 8 cases about 12 months; with the other cases longer.

### History IX

Marie J. 25 years old, workman's wife, country, Jutland.

*Arthr. tub. cubiti sin. c. abs.*

Without previous trauma was affected in left elbow Dec. 1915. Has since been treated with starch bandage. Came to Finsen Institute June, 1916. There was then considerable swelling round left elbow joint especially round epic. ext. humeri, where fluctuation also was felt. Motility from  $120^{\circ}$  to  $150^{\circ}$ ; slight pronation possible, no supination. *Roentgen picture* of  $20/1$  16 showed periosteal covering of coll. radii and of ulna, and illumination of radial edge of ulna just by the joint-surface. The patient has light baths from  $27/6$  16— $14/3$  17, in all 153 baths. On  $11/10$  16 an abscess on exterior side of elbow was incised, and thin fluffy pus emptied out; incision healed  $14/3$  17, flexion to  $90^{\circ}$ , extension to  $170^{\circ}$ , pronation normal, supination restricted. In Oct. 1917 she writes that she is well, her arm healed and not swollen or tender; able to do all housework. In Oct. 1920 same report.

### History X

Aug. J. 19 years old, cigar sorter, Copenhagen.

*Arthr. tub. cub. dext. sequest. resect.*

Without previous trauma was affected in right elbow in March, 1917. First applied to out-patient department of hospital where he was operated on twice. In May, 1917, admitted to another hospital where he was operated on 4 times, staying there till Oct. 1917. Again underwent treatment at another out-pat. dept. but steadily failed to recover. In May, 1918, came to the Finsen Institute, where he was treated ambulant. There was considerable swelling and infiltration round the joint, and 10 fistulas in all. Only with the utmost effort could he hold up his arm without support. Active motility  $130-140^{\circ}$ . Rotation  $1/4$  of normal. Wm  $\div$ , Pirquet + *Roentgen picture*  $21/5$  18 showed very considerable osseous destruction and, at any rate cap. radii and proc. olecrani, and a piece of humerus removed. Light-bath every second day from  $11/5$  18— $21/12$  18, in all 94 light-baths.  $16/10$  18 healed. Strength increases. Active flex.  $65^{\circ}$ , exten s.  $150^{\circ}$ , rotation greatly restricted.

March, 1920, still capable of working; motility  $25^{\circ}-165^{\circ}$ , supination deficit  $30^{\circ}$ , pronation def. only a few degrees; a couple of small fistulas on the elbow.  $8/7$  20 a small abscess in plica cub. incised. Light-baths from  $15/7$  20— $23/10$  20 in all 39 baths.  $14/9$  20 incision healed, but small lupus infiltration appeared, treated with conc. light. Since 1919 has worked as cigar sorter. May, 1921, all in order.

### Shoulder (uncomplicated cases)

7 patients all over 15 years, 5 of whom had been ill for more than 6 months before the light baths began. With 6 of those treated there were osseous changes in the roent. picture. During the treatment it became necessary with one patient to puncture, incise, and finally resect. All 7 patients were cured, 3 with entirely free motility, 2 with partial motility (including the resected), and 2 without motility; the latter had been ill 5 and 7 years respectively before the light-bath treatment commenced. All 7 patients were controlled, 5 for more than 12 months, and 2 for more than 3 years after completion of treatment. Relapse occurred in none of the cases. 5 of the patients were under treatment for about 6 months, one for about 15 months, and one for about 2 years.

### History XI

Luise J. 29 years old, spinster, factory girl. Copenhagen.

*Arthr. tub. humeri sin. tub. pulm.*

In the beginning of 1917, without any known cause, she got pains in left shoulder joint; some months later Tub. pulm. was substantiated, for which she underwent treatment at Nakkebölle Sanatorium during 4 months until August, 1917. In the summer of 1918 she got hæmoptysis, for which she was admitted to a Copenhagen hospital for tuberculosis, from which on  $20/7$  18 she was removed to the Finsen Institute. At the examination of left shoulder, in which she at times had severe pains, there was flattening of the left hindmost part of deltoideus, somewhat restricted motility and 1 cm. atrophy of left upper arm. *Roentgen picture*  $22/4$  18 (private roent. clin.) had only shown atrophy of the bones. Stethoscopy showed a predominant one-sided lung affection with T. B. in the expectoration. She had light-baths from  $23/7$  18— $26/4$  19, in all 90 baths.  $20/4$  19 there was considerable improvement; the pains were less and motility better; only bending backwards (coat movement) hurt her. In the summer of 1919 she was again at Nakkebölle Sanatorium.  $4/10$  20 is noted: continued unrest in left shoulder, but motility entirely free, and she is working in a shirt factory. *Roent. picture*  $22/10$  20 showed a 1 cm. deep defect on upper part of caput humeri, continuing as an indistinctly confined illumination into the bone.

The patient is therefore a fine example of the phenomenon previously asserted by me, that the roent. changes trail after the clinical phenomena. At the point when these were at their climax the roent. picture showed nothing abnormal, but when the clinical phenomena had almost settled down the *roent. picture* showed pronounced changes.  $21/6$  21 is noted: On and off slight pains in left shoulder; motility entirely free.

### Shoulder (complicated cases)

In all 8 patients were treated, 6 of whom were over 15 years. All 8 had been ill for more than 6 months before our treatment began, and the Roent. picture showed osseous changes with all 8. 2 of the

patients had been incised several times before the light-bath treatment, and during this treatment puncture was made with 4 patients, with one of these 10 times, and with one incision and evidment were made. One patient was cured with entirely free motility, 4 with partial, and two without. Both these two had ankylosis when they came for treatment. One patient was not influenced by the light-bath treatment at all. He was an extremely run-down man who in addition had severe tuberculosis of the lungs.

6 of the patients cured were controlled, of whom 2 were controlled for more than 12 months and 1 for more than 3 years after conclusion of treatment. In two cases there was relapse, but both were cured by renewed light-bath treatment. One patient died of tuberculosis of the lungs 2 years after conclusion of treatment. In 3 cases the treatment was concluded in about 3 months. In the others it lasted longer, up to 2 years.

### History XII

Anna E. 17 years old, spinster, servant. Copenhagen.

*Arthr. hum. c. abs.*

From 1913 tub. affection of left wrist. First treated with incision and scraping; later went to coast hospital where she spent 3 years and recovered. In 1917 fistular formation again appeared at left wrist, and in Jan. 1918 also swelling and pains in right shoulder-joint. Some months later was referred to Finsen Institute. Left hand greatly deformed and atrophic, with small fistula. Right shoulder the seat of diffuse swelling, especially prominent at posterior edge of deltoideus; right upper arm held  $15^\circ$  abducted, and from here can be further abducted  $10^\circ$ — $15^\circ$ ; rotation almost entirely ceased, flexion the same. *Roent. picture*  $11/7$  18 shows illuminated parts round tub. majus; in cav. glen. are destructions. Light-baths from  $26/7$  18— $10/6$  19, in all 98 baths. Even before the light baths puncture of the abscess under deltoideus had been made 3 times; punctures repeated 7 times, later, of which several with injection of iodoform glycerine.  $18/9$  18 a fistula formed on one of the puncture places; this closed in Dec. 1918, and at that time the motility in right shoulder-joint approached normal.  $7/5$  19 hand healed. The shoulder recovered, no pains; movements free except backward bending. Roentgen picture still showed destruction in edge of cav. glenoid. Oct. 1920 complete good health. Free motility in right shoulder; works in factory as packer.

### Ankle-joint (uncomplicated cases)

In all 14 cases were treated. Of these 8 over 15 years. In 10 cases the disease had lasted for more than 6 months before the light-bath treatment began. In 9 cases the Roentgen picture proved osseous changes. All 14 patients recovered, 9 with entirely free motility, one with partial, and 4 with none; of the latter 2 had been ill 18 months and 2 years respectively, before they began light-bath treatment. 13 of

the patients were controlled later. 7 for more than 12 months, and 3 for more than 3 years, after conclusion of light-bath treatment. In no case did relapse occur. In 8 cases the treatment lasted about six months, with the remainder fully 2 years.

### History XIII

Ingeborg O. 18 years old, country, Funen.

*Arthr. tub. pedis.*

12 years old when first attacked in left ankle. Later similar cases twice. In Jan. 1916 hurt left foot at gymnastic drill, after which was treated with confinement to bed and plaster of Paris bandage. With this treatment there was but little change in the affection. Arrived at Finsen Institute Jan. 1917. There was then swelling round left ankle, and sensitiveness to pressure corresponding to the joint line. The foot was held in plantar inflected position and from here could not be dorsal inflected to right angle, but only to  $105^{\circ}$ . Ab- and adduction only possible to slight extent. *Roentgen picture*  $^{17}/_1$  17 showed severe atrophy of the bone, otherwise nothing. The patient received light-baths daily from  $^{23}/_1$  17— $^{12}/_1$  17, in all 115 baths. When she stopped the light-baths there were no pains or swelling. Plantar flexion normal, deficit of  $10^{\circ}$  in normal dorsal flexion. Walked well with aid of 2 sticks. Later been able to perform her share of work in her home, and in Oct. 1920 writes that she has attended a course in modern dancing and been to 3 balls without inconvenience.

### Ankle-joint (complicated cases)

In all 33 patients were treated, of whom 26 were over 15. In 30 cases the disease had lasted six months before the treatment began. Osseous changes were substantiated with 29 patients. In 6 cases resection was performed before the light bath. In 9 cases incision and evidment and in 1 case resection were made during the light-bath treatment. In 28 cases cure was attained; in 14 of which with entirely free motility, in 12 with partial, and in 2 with none. Improvement was obtained in 2 cases, as an insignificant fistula remained.

One patient, a man of 49, was so run down by complicating tuberculous affections and degeneratio amyloidea that after some few light baths amputatio cruris was performed. He died 2 months later cachectic. One patient with fistulous ostitis talo-cruralis got sepsis after a single light bath, and despite arthrotomy this led to death a few days later. One patient broke off the light-bath treatment prematurely, as for the rest at the time improving.

All the cured and improved were controlled; 14 for more than 1 months, and 11 for more than 3 years after completion of treatment. Relapse was substantiated in one case, as an insignificant fistula reappeared, while the motility remained normal continually. Besides the

2 deaths mentioned during treatment there was one man over 70 who died later from tuberculosis of the lungs. One young girl died of tubercular meningitis 3 years after completion of treatment, and one man died of influenza 6 months after treatment. In some few cases the treatment lasted about 6 months, but in the majority longer, up to about a couple of years.

#### History XIV

Ninna L. 16 years old, country, Jutland.

*Arthr. tub. pedis fist.*

Feb., 1916, pleuritis. Summer of 1916 swelling of right foot. Oct. 1916 and March, 1917, incision was made and pus emptied out. May, 1917, dilation in right poples; spontaneous perforation at end of June. Came to Finsen Institute  $7/8$  19. She was pale, fragile, and thin. There was affection of both apices. *Right ankle-joint* the seat of considerable swelling. On upper part of foot 2 secerning fistular openings partly filled with spongy granulations. Great sensitiveness to touch. Active motility in the ankle-joint  $20^{\circ}$ — $30^{\circ}$ . Cannot be inflected to a right angle. In right poples a small greatly secerning fistula opening. No accumulation in right knee-joint, which can be moved from  $45^{\circ}$ — $160^{\circ}$ . *Roentgen picture*  $13/8$  17 of right foot showed osseous destruction corresponding to os naviculare. Light-baths daily from  $8/8$  17— $12/6$  19, and every second day from  $14/8$  19— $8/10$  19. In all 501 baths. On  $15/10$  17 under ether narcosis incision made on inside of foot with emptying-out of pus. Foot still in equinus position, could only be moved  $10^{\circ}$ — $15^{\circ}$ . Fistula on post. side of femur healed in Nov. 1917. Knee then natural with free motility. *Roentgen picture*  $15/10$  18 showed considerable osseous changes in calcaneus, talus, and os cuboideum.  $9/10$  19 cured everywhere with exception of small superficial fistula on inner side of foot. Dorsal flexion to  $90^{\circ}$ . Plantar flexion to  $135^{\circ}$ . Side movement only a few degrees. At control  $28/7$  20 the fistulas were found closed. Flexion and extension to normal degree. Side movements increased. Can walk any distance without inconvenience. *Roentgen picture* still shows osseous changes. A letter July, 1921 — still complete good health and foot sound.

#### History XV

Christian B. C. 52 years old, married labourer. Copenhagen.

*Arthr. tub. pedis sin. Tub. pulm.*

Since 1913 Tub. Pulm. Treated at Ø. Hospital. In 1914 distortion of left foot with subsequent swelling. Treated at a out-patient departement in Copenhagen with plaster of Paris bandage, and later évidement, after which several fistulas formed, which did not heal for 4 years. During this period has taken air cure at Kalvebod Bastion. In March, 1918, admitted to a surgical ward in a Copenhagen hospital, where amputation was proposed, but which he refused. For which reason he was referred to Finsen Institute in April, 1918. Apices of both lungs affected. *Left foot* in tapering foot position. Angle at  $120^{\circ}$  and can be moved from here only  $20^{\circ}$ . Side movements very small. Diffuse swelling of ankle-joint, especially on lateral side where the skin is infiltrated with a quantity of small fistulas. Behind malleolus int. the skin is bluishly infiltrated and 3—4 fistulas. *Roentgen picture*  $17/4$  18 unevenness of malleolus int. Treated with light-baths every second day from  $12/4$  18— $17/7$  19, in all 186 baths.

To counteract the plantar flexion elastic pulls from the foremost part of planta pedis to the knee were employed, as has been done in numerous cases. In Nov. 1918 he was allowed to stand on his foot. July, 1919, everything healed. Motility  $105^{\circ}$ — $125^{\circ}$ . July, 1921, still healed; same motility; walks well on his foot.

### Knee (uncomplicated cases)

In all 42 patients were treated, of whom 28 were over 15 years. 34 patients had been ill more than six months before light-bath treatment commenced. With 24 patients changes were substantiated in the roentgen picture. 27 patients were cured; 15 of whom with free motility, 7 with partial, and 5 with none. With 8 of the 15 with free motility there were changes in the roentgen picture, and 5 of the 15 were referred to us by Copenhagen surgeons under the diagnosis tuberculosis. 2 patients improved, one recovering entirely later, on account of careful attention at home. 8 patients were uninfluenced by the light bath, and with 5 of these resection was made later, and with 2 amputation. 4 patients broke off the treatment, and one, who besides tuberculosis in the knee-joint had 14 other localizations of surgical tuberculosis, passed away.

The 29 cured and improved were all controlled, 10 for more than 12 months, and 11 for more than 3 years after conclusion of treatment. Relapse was substantiated in 5 cases; of these one recovered later. In a very few cases the treatment lasted about 9 months, but in most longer, up to 2 years.

### History XVI

Knud W. N. 8 years old, Copenhagen.

*Arthr. tub. genus sin.*

In Feb. 1915, some time after trauma of left knee, swelling and stiffness of this set in. Since May, 1915, he has been under treatment partly in a coast hospital and partly at a private clinic on the coast, where latterly he has been treated with plaster of Paris bandage. Only slight swelling of *left knee*, and flexion possible to  $140^{\circ}$ . Treated with light-baths daily from  $19/8$   $15-3/3$  16, and every second day from  $2/3$  16— $28/3$  16, in all 166 baths. Was treated with hinder plaster of Paris splint, and confined to bed till Jan. 1916. In March, 1916, there was nothing abnormal to be discovered in the knee-joint; but atrophy of musculature of thigh, and examination in Nov. 1920 gave same result. The boy now does athletics without inconvenience.

### History XVII

Poul W. C. 6 years old, Market town. Jutland.

*Arthr. tub. genus sin.*

In March, 1918, swelling and pains occurred in left knee. Referred to Institute



<sup>20</sup>/<sub>7</sub> 18. At that time swelling of *left knee*, especially of bursa subcrurea. Impact of patella. No tenderness along joint-line. Motility almost completely normal. *Roent. picture* <sup>18</sup>/<sub>7</sub> 18 showed no bone atrophy. Was treated with light-baths from <sup>22</sup>/<sub>7</sub> 18—<sup>13</sup>/<sub>11</sub> 18 in all 44 baths. Nov. 1918 no pains, normal motility. But still slight increase in circumference. Jan. 1919 severer swelling appeared, for which reason on <sup>6</sup>/<sub>2</sub> 19 puncture was made with emptying of 14 ccm. serous fluid, and injection of 10 ccm. iodoform emulsion and application of plaster of Paris bandage. He then resumed light-baths every second day from <sup>15</sup>/<sub>4</sub> 10—<sup>7</sup>/<sub>2</sub> 20, in all 122 baths, with simultaneous employment of hinder plaster of Paris splint. On <sup>3</sup>/<sub>2</sub> 20 nothing abnormal was found on inspecting left knee, and no swelling was felt, but the circumference over patella was, however, 28 cm. against 27 on right side. Patella shiftable, no impact. Motility 110°—180°. 5 cm. atrophy of left femur. *Roent. picture* <sup>3</sup>/<sub>2</sub> 20 showed slightly irregular though faintly pronounced fraying of joint-surface on epicondylus medialis. There is also rather considerable halisteresis. <sup>12</sup>/<sub>7</sub> 21 he presented himself, was quite well, and ran about all day. No pains, no swelling nor tenderness of the knee. Patella freely shiftable. Motility 70°—180°. 2½ cm. atrophy of femur. Has worn hinder splint up to a few months ago. *Roent. picture* <sup>12</sup>/<sub>7</sub> 21 shows entirely normal conditions.

### *Knee-joint (complicated cases)*

14 patients, of whom 11 over 15 All 14 had been ill for more than 6 months before the light-bath treatment commenced. With 12 *Roent. pictures* showed osseous changes. 2 were not radiographed. With 6 patients resection, and with 2 incision had been performed before the light-bath treatment began. 9 patients were cured, one with free motility, one with partial motility, and 7 with none. Amongst these were 5 of the 6 resected. 2 patients improved, 2 were unchanged, and one broke off the treatment. One of those unchanged was amputated later. 9 of the cured and improved were controlled, 3 more than 12 months after conclusion of treatment. Relapse was substantiated in 2 cases; with the one, a man over 70 years it ended in amputation, with the other, a girl of 12 an abscess round the knee developed. One patient died of coma diabeticum more than 5 years after conclusion of treatment.

### History XVIII

Ida E. 20 years old. Market town. Jutland.

*Arthr. genus fist. Ostitis nasi fist. Caries costae fist. Lupus fac. et colli.*

Affection in right knee from the age of 10. Treated at a coast hospital for about 2 years. Relapse at the age of 16. Suppurating lymphomas on neck, and furthermore lupus on right cheek and fistulous ostitis nasi. Entered Finsen Institute August, 1912. During the first year her affections showed only slight change. In March, 1913, a large congestion abscess developed on the back, originating in a small caries costae. In August, 1913, as one of our very first patients, she began the

treatment with artificial light-baths. With long interruptions she continued these till  $19/4$  16, and had in all 182 light baths. When she began she had numerous fistulas round right knee, fistula on the nose, and also fistula on the back after congestion abscess. The fistulas round the knee had existed for the previous 5 years. On  $31/8$  14 all fistulas were healed. She remained well till Dec. 1919 when, having at this period incurred severe diabetes, she had a relapse of her knee complaint. Died in coma diabeticum, after a miscarriage in Jan. 1920.

### History XIX

Harald J. J. country. Sealand.

*Arthr. genus fist. Seqv. resectionis.*

Affection of right knee from Jan. 1915. In a hospital from Feb. till April, 1915. Treated with plaster of Paris bandage, which at home was removed by the parents. Re-admitted to same hospital from April—Sept. 1916. On  $11/4$  16 resection was made, after which there were several depressions round the knee. These were incised, but as the ensuing ulcerations showed no signs of healing, he was removed to Finsen Institute in Sept. 1916. On the front of the knee was then found a wound 5 cm. high and 12 cm. broad, but which also sent an 8 cm. extension down the inner side of tibia. On the posterior side of crus a 20 cm. long and 3 cm. broad granulating ulceration, and further an ulceration the size of a two-shilling piece and 4—5 fistulas. He was treated daily with light-baths from  $9/9$  16— $7/5$  17, and afterwards every second day for a fortnight. In all 206 light-baths. He further was treated with local light treatment. At the beginning of June, 1917, he was completely healed. Likewise  $25/6$  19 when he last presented himself.

### Hip-joint (uncomplicated cases)

In all 7 patients were treated, one with double coxitis. 2 patients were over 15. 3 patients had been ill for more than 6 months before they began their light-bath treatment, and 2 of these had ankylosis. Roent. picture showed osseous changes with 5 patients. 5 patients were cured; one with free motility, one with some motility. This was a young man of 16 who had double coxitis with secondary abscess formation round one hip. For the rest he had a relapse, but recovered also from this, and has now been well for 12 months. 3 patients recovered without motility, and two broke off the treatment. 5 patients were controlled; one for more than 12 months, and 3 for more than 3 years after the conclusion of treatment. Besides the relapse mentioned, one patient had secondary adduction contraction.

### Hip-joint (complicated cases)

15 patients were treated, 12 over 15 years. All had been ill more than six months before they began the light-bath treatment. Roent. picture showed osseous changes with 2 patients. Resection had pre-



viously been performed with 8 patients, and they were therefore treated for fistulas. Of the patients treated 8 were cured, 4 with some motility and 4 without. 5 were, if anything, unchanged, and one broke off the treatment. One died under treatment. He had been ill for 8 years, had 3‰ alb. in the urine, and degeneratio amyloid.

Of the patients tabled unchanged 2 died shortly after the treatment had been given up. 8 of the patients were controlled; 2 for more than 12 months, and 4 for more than 3 years after conclusion of treatment. Relapse occurred in 2 cases, abscess formation round the hip being the cause in both cases. One was again cured under light-bath treatment, and the other seems well on the way to being so. In almost every case the treatment lasted for 12 months or longer.

#### *Caries in sternum and costae (complicated cases)*

In all 32 patients were treated, 29 over 15 years, 24 of the patients for more than 6 months before the light-bath treatment commenced. 20 of the patients had undergone previous operations, and therefore were treated for post-operative fistulas, while the remainder were treated for abscesses. Under the light-bath treatment puncture was performed with 5 patients, évidemment with 2, and costal resection with one. Of the patients 23 healed. In 5 cases healing was not successfully attained, and 4 patients broke off the treatment. All those healed were controlled. 4 had relapse, of whom 3 had tuberculosis of the lungs. The fourth healed after operation. Of the unchanged cases 3 have died later, 2 of whom of tuberculosis. Of the cured cases without relapse the duration of the treatment has been down to 3 months in only one case, otherwise it has been from 6 to 12 months.

#### History XX

Herluf H. 27 years old, bachelor, sergeant.

*Caries costae fist. Caries sterni fist.*

January, 1918, pleurisy. First treated at military hospital and then for six months at Sanatorium. At the military hospital test puncture was made several times, an abscess developing in the region. This was incised during his stay at the sanatorium. Furthermore, abscesses and fistulas formed round manubrium sterni. After this stay at the sanatorium he was again in the military hospital for 6 months without the fistulas on the thorax improving. Referred to Finsen Institute in June, 1919. On the upper part of the front of the thorax were then found a number of fistulous ulcerations. In 1. regio infrascapularis were found some cicatrices in which were several fistulas. He was treated with light baths every second day from  $\frac{4}{8}$  19— $\frac{29}{9}$  1920. On  $\frac{22}{10}$  19 incision of right infrascapularis had to be made, and

resectio costae on  $\frac{9}{4}$  20. The very strongly secerning fistulas on manubrium were completely healed in May, 1920, and the fistula on the back in July, 1920.

*Microscopy* of the tissue removed at operation showed tuberculosis. In April, 1921, he was still healed up, and all in right order.

### *Ostitis fistulosa* (complicated cases)

In all 60 patients were treated, who together had 73 cases of severe ostitis besides a number of light cases which have not been separately summed up. As regards localization the cases of ostitis are distributed as follows. Maxille 3, Zygoma 3, Theca cranii 6, Radius and Ulna 24, Humerus 5, Scapula 3, Clavicula 1, Tibia and Fibula 11, Patella 1, Femur 11, five of which in Trochanter, Calcaneus 4, First Metatarsus 1, Multiple Ostitis 1.

Abscess occurred in 16 cases, fistula in the remainder.

47 of the patients were over 15 years.

In 62 cases the disease had lasted for more than 6 months before the light-bath treatment began. Roentgen picture showed osseous changes in 38 cases. Before the light-bath treatment incision and évidement had been performed in 38 cases and during the treatment puncture of abscesses was made in 5 cases, and incision and évidement (sequestrotomy) in 13 cases, of which 7 had undergone operation before. Recovery occurred in 68 cases, improvement in 2, as an inconsiderable fistula remained. One patient remained unchanged, but was cured later when the wound was scraped. One case ended in death. This concerned a case of ostitis in the upper end of humerus, where pyarthrosis occurred in the shoulder-joint, and in spite of resection sepsis developed. One patient broke off the treatment. 68 cases were controlled, 41 for more than 12 months, and 13 for more than 3 years after conclusion of treatment.

Relapse was substantiated in 2 cases, viz., 1 case of ostitis trochanteris and one case of ostitis humeri. Both healed with renewed treatment. 3 patients have died later, 2 of tuberculous meningitis.

As regards duration, we have in this group some cases with extremely short course, as we have often obtained recovery in 1 or 2 months, and only severe cases have lasted more than 6 months. Individual very severe cases, especially ostitis in femur and trochanter, lasted still longer.

### History XXI

Josef M.  $3\frac{1}{2}$  years old, son of travelling musician.

*Ostitis tub. fist., os. zygom. utr. Arthr. tub. cubiti sin. fist. Arthr. tub. pedis sin. fist. Ostitis tibiae dext. fist.*

When the child was 2 years old an abscess answering to both ossa zygomatic occurred on right side; spontaneous perforation with emptying of pus. On left side incision. For a year swelling of left elbow and fore-arm to varying extent; spon-

taneous perforation short time ago. On the posterior side of right calf he has been operated on twice 9—10 months ago, after which constant fistula. Also on left crus constant fistula after incision 5 months ago. Entered Finsen Institute  $22/7$  16. The child was thin, miserable and could not stand on his feet. W: negative. Pirquet: decidedly positive. Under *right eye* a cicatrix, under *left eye* a fistula. *Left ankle-joint* seat of considerable swelling, tenderness, and great restriction of movement. The swelling extends up along crus, where, on the front, is a secerning ulceration. At the back of malleolus int. a small fistula with copious secretion. On the posterior side of *left crus* two secerning fistulas. *Left elbow* seat of fusiform swelling, and behind epicondylus externus a large ulceration with undermined edges. Motility  $90^{\circ}$ — $150^{\circ}$ . Rotation natural. *Roent. picture* showed strong dislodgement of lower end of left tibia with heavy periosteal covering. *Roent. picture* of left elbow showed fraying of the joint-line of eminentia capitata. He was treated with light-baths daily from  $24/7$  16— $29/8$  17, in all 268 baths. On  $30/8$  16 the fistula under left eye was healed. On  $22/9$  16 arthrotomy of artic. tali-crural sin. had to be performed on account of pyarthrosis. On  $6/10$  16 the fistula at left elbow was healed, motility  $150^{\circ}$ — $170^{\circ}$ , and  $18/10$  10 the fistula on right calf healed. On  $16/5$  17 left foot healed, and the motility more free. On  $29/8$  17 he was still healed up everywhere. Motility in left elbow and left foot as near normal as possible. For private reasons the light baths had to be broken off, the parents having to go abroad. Letter in Jan. 1919 reported that he was perfectly well.

### History XXII

Kresten S. 19 years old, servant, country, Jutland.

*Ostitis thecae cranii. Caries costae c. absc.*

In March, 1917, an abscess came without cause on theca cranii. It perforated spontaneously in June. Was later in a provincial hospital, where carious bone tissue was several times removed.  $19/5$  19 he was referred to Finsen Institute. He was pale, exhausted and pulled down. There was affection of right lung. In *right regio parietalis* was a reniform wound 5 x 3 cm. in size, running through the entire thickness of the cranium, so that the bottom of the wound was formed by dura. In front necrosis and copious secretion, also undermining of the edges of wound. On the back of *right half of thorax* a large cold abscess. Behind *right ear* an irregular ulceration originating in a gland. He received light baths every second day from  $19/5$  19— $16/7$  20, in all 161 baths. On  $4/6$  19 évidement with scraping of the tuberculous granulations was performed. The osseous tuberculosis was specially located in lamina interna, and has spread specially downwards and towards the front. With curette and snippers as much as possible of the tuberculous bone tissue was removed. The abscess on thorax punctured  $18/7$  and  $26/7$ , and in Jan. 1920 could no longer be proved. On  $19/11$  19 a number of loose sequestra were removed from the wound in cranium, after which the healing began to improve rapidly, and July 7, 1920, he was completely healed up. In Oct. 1920, further, all in good order.

### History XXIII

Hans Kr. 20 years old, fisherman, Jutland.

*Ostitis fistulosa antibr. utr. Spina ventosa metatarsi I dext. Absc. pedis sin.*

In July, 1916, a small nodule formed spontaneously above right wrist. He was

operated on in a military hospital. In the period following abscesses developed in various places, so that altogether he was operated on 10 times without the ensuing wounds showing any tendency to heal. At one of these operations right ulna was found to be exposed to a large extent.

*Microscopy* proved tuberculosis. In April, 1917, he was referred to Finsen Institute. He then had 3 fistulous cicatrices on *right fore-arm*, and 3 ulcerations on *left fore-arm*. An ulceration the size of a pea, and answering to 1<sup>st</sup> os metatarsus, on *right foot*. A fluctuating part as large as a shilling on *left foot*. He was treated with light-baths daily from  $\frac{3}{4}$  1917— $\frac{23}{9}$  17, in all 135 baths. *Roent. picture.*  $\frac{25}{1}$  showed periosteal covering of right and left elbows. In Sept. 1917 he was completely healed up and has remained so.

Controlled  $\frac{11}{10}$  20. Strength good, and free motility everywhere. Works as a fisherman.

### *Ostitis pelvis* (complicated cases)

In all 11 patients were treated, of whom 8 were over 15 years. 10 of the patients had been ill for more than 6 months before they came for treatment. Three of these 7, 8 and 18 years respectively. *Roent. picture*, showed changes in 5 cases; 4 were not radiographed. 8 of the patients had been operated on before treatment. Under the light-bath treatment puncture was performed with 3 patients, and with one numerous times. 6 patients were cured, 3 were unchanged, having been ill 2, 8 and 18 years respectively. 2 patients died during the light-bath treatment, one of tuberculosis, the other, who apparently was recovering, of septic angina. All 6 cured were controlled; one for more than 12 months, and 2 for more than 3 years after conclusion of treatment. No relapse was substantiated. The treatment lasted under 12 months only in a very few cases, and between 1 and 2 years in the majority of cases.

### History XXIV

Senius P. 24 years old, bachelor, tailor, country, Jutland.

*Ostitis pelvis c. abs. Ostitis radii dext. Ostitis ulnae sin fist.*

At the end of 1918 pleuritis exudativa. In the beginning of 1919 tub. tibiae sin. c. abscessu, operated on at a provincial hospital. Oct. 1919 tenderness in right sacral region and swelling. Nov. 1919 swelling of lower third of left fore-arm. This perforated spontaneously in the middle of Jan. 1920, and almost simultaneously there was swelling and soreness answering to extrem. inf. radii dextra. On  $\frac{29}{1}$  20 he was referred to Finsen Institute. On right half of *os sacrum* was found an abscess the size of an orange, which extended upwards and superficially in front of the lower lumbar vertebrae, and also communicated with an abscess in right nates. No tenderness of columna or pelvis, but sensitiveness in right articulation sacroiliaca with direct and indirect percussion. The movement in columna proceeded quite unhindered. On *left fore-arm* ulnar and dorsal perforation downwards, and a good deal of swelling and infiltration in the circumference. The wrist free except for the

supination being reduced by half. *Right fore-arm*; swelling and considerable tenderness along lower edge of radius. *Left knee*; medially to ligament infrapatellaris an angular adherent cicatrix, in which a fistula the size of a pea. Motility of knee  $70^{\circ}$ — $180^{\circ}$ , for the rest entirely natural. *Roent. picture*  $\frac{1}{2}$  of columna lumbalis et sacralis showed nothing decidedly abnormal; of left wrist an illumination about the size of a hazel-nut in the lower end of ulna about  $\frac{1}{2}$  cm. above the joint; of right wrist 2 illuminations about the size of beans in extremitas inf. radii just above the joint; of left knee nothing abnormal. The patient received light-baths every second day from  $\frac{2}{2}$  20— $\frac{22}{4}$  21, in all 160 baths. On  $\frac{4}{3}$  20 puncture was made in right nates, when 50 ccm. brownish thin pus with much fluff. 10 ccm. iodoform glycerine was injected. The abscess on nates quickly decreased in size, whereas the abscess on right fore-arm increased, so that on  $\frac{19}{3}$  20 puncture had to be made with injection of 3 ccm. iodoform glycerine, and puncture again  $\frac{31}{3}$  20. June, 1920, the knee was reliably healed. No abscess could be proved in right nates, nor on right fore-arm, but there still was ulceration of the dorso-ulnar side of left fore-arm. Complete function of left hand. Nov. 1920 left arm healed. *Roent. examination*  $\frac{5}{1}$  21 of both wrists showed nothing abnormal. On  $\frac{20}{4}$  21 everything was still in order, and also at control examination  $\frac{3}{8}$  21.

#### *Spondylitis (uncomplicated cases)*

In all 7 cases were treated, of which the 5 cured and improved might well be regarded as light cases, as ambulant treatment was successfully carried out with simultaneous application of leather corsets. For treating severe cases of spondylitis the conditions at the Institute have not hitherto proved suitable, as the light baths are in a special building, the patients having to be carried on stretchers to and from the bath. 5 of the patients treated were over 15 years; 4 of them had been ill for more than 6 months. Roentgen picture proved osseous changes with 4. Four patients recovered, of these there were osseous changes in the Roent. picture with 3. One improved. 2 broke off the treatment, one of whom had received treatment under Rollier during  $3\frac{1}{2}$  years. The 4 recovered were all under control for more than 12 months after conclusion of treatment. In no case did relapse take place. With those cured the treatment lasted 9—12 months.

#### *Spondylitis (complicated cases)*

In all 20 patients were treated, of whom 16 were over 15 years, and had been ill for more than 6 months before they came under our treatment. 9 of the patients had abscess when they came for treatment. 11 had fistulas, as regards 7 during a very considerable number of years, viz., 3, 4, 6, 8, 16, 17, and 27 years. Roentgen picture proved osseous changes in 5 cases, but 10 patients were not radiographed.

11 of the patients recovered; one improved after 12 months' light-bath

treatment, and later healed at home. 3 patients amongst those who had been ill for many years remained unchanged, and 2 patients broke off the treatment. In three cases there was coming mors during treatment. These were a young man of 19 who had been ill for 17 years, a man of 49 who had been ill for 6 years, and a child of six who had been ill for 2 years.

Of the 12 recovered and improved 11 were controlled; 7 for more than 12 months and 2 for more than 3 years after completion of treatment. Relapse was substantiated in 1 case. One of the unchanged and 1 of those who broke off the treatment died later of spondylitis.

### History XXV

Erna J. 21 years old, wife of clerk. Copenhagen.

*Spondylitis fistulosa vertebr. lumbal I.*

In Dec. 1917 the patient noticed a distension in right side of the abdomen. On  $^{10}/_1$  1918 she was admitted to a Copenhagen hospital, where 2 days later incision was made above right ligament, when 1 litre of cream-like pus was emptied out.

*Microscopy* of the abscess membrane showed typical tuberculosis. A later Roentgen examination at the hospital after injection of bismuth paste showed that the abscess cavity extended up towards vertebra lumbalis I. As the fistula continuously remained she was referred to Finsen Institute  $^{8}/_4$  18, where a large strongly discharging fistula was found above right ligament, and from it a cord the thickness of a pencil extending up into the abdomen. She was treated with light-baths from  $^{8}/_4$  18— $^{25}/_9$  18, in all 56 baths. On  $^{28}/_8$  she was healed and remained so. Was last controlled in the spring of 1921. Since her illness has borne a child.

### History XXVI

Laura H. 52 years old, widow, Copenhagen.

*Spondylitis fistulosa. Arthr. sterno-clav. fist. Sequ. resect.*

In the autumn of 1917 an indolent nodule developed in left lumbar region. It was incised in Dec. at a Copenhagen hospital, with emptying of pus, and a carious arcus vertebrae was come to. Continuous fistula since. During this stay in the hospital an affection of right artic. sterno-clavicul. formed, for which a resection was performed in April, 1918. The wound healed, but broke out again a couple of months later, after which, in spite of repeated evidements, a strongly secerning ulceration has maintained itself. *Microscopy* showed tuberculosis. Referred to the Institute in Oct. 1913. Answering to the 1<sup>st</sup> lumbal vertebrae there was then found a fistula-opening the size of a pea, from which moderate secretion of thin yellowish pus. No sensitiveness of columna to direct or indirect pressure. Movements free. Corresponding with right artic.-sterno clavicularis a 4 x 2 cm. large but moderately secerning ulceration filled with bluish relaxed granulations. She was treated with light-baths from  $^{26}/_{10}$  18— $^{9}/_9$  19, in all 89 light baths. On  $^{10}/_7$  19 the fistula on back was healed, but as strongly secerning fistulas corresponding with right artic. sterno-clavicul. still remained. Evidement with removal of a typical tuberculous sequestrum the size of a hazel-nut was performed under ether narcosis on  $^{11}/_7$ . On  $^{22}/_8$  she was completely healed and her motility in right artic. sterno-clavicul. normal. October, 1920, continued good health; healed.



## History XXVII

Mary M. 21 years old, servant. Copenhagen.

*Spondylitis lumb. fist.*

In 1916 in a hospital for pleuritis. Shortly afterwards she began to suffer from pains in the loins. In Nov. 1918 admitted to a Copenhagen hospital for abscess in left inguen, which was incised and scraped out. With a long, sharp curette denuded bone on columna lumbalis was felt. Subsequent swinging temperature. On  $25/3$  19 an abscess above right ligam. fall. was punctured. On  $6/3$  19 incision same place. On  $10/12$  19 she was referred to the Institute, remaining in the hospital but being driven to Inst. for light baths. There were *fistulas in both inguens*. *Roentg. picture.*  $23/1$  20 after bismuth inject. showed that both fistulas inclined up towards III—IV lumbal vertebra. She had light-baths every other day from  $11/13$  19— $12/6$  20, in all 68 baths.  $1/3$  20 fistula in left inguen healed,  $26/5$  20 fistula in right inguen healed, Oct. 1920 still healed, with perfect good health.

*Subcutaneous Tuberculosis*

This concerns abscesses in the subcutaneous tissue or wounds after such developed at the operations, and with which it has not been possible to prove any osseous affection, nor in the 14 cases where roent. picture has been employed to prove osseous changes. Therefore one naturally dare not with certainty assert that in a few of these cases it might not be a question of insignificant ostitis. Further have to be reckoned 6 patients with fistula tub. ani, where microscopy had been performed in all cases.

In all 42 cases have been treated, of which 30 patients were over 15. 23 patients had been ill for more than 6 months when they came under the light-bath treatment, and 23 patients had been operated on before they came under our treatment.

During the light-bath treatment puncture was performed in 6 cases, incision and évidement in 5 cases. With 2 patients with fistula ani even numerous times, after which they were energetically treated with 33 % of lapis as previously described.

37 cases recovered; in 2 cases there was improvement; one case remained unchanged. 2 patients broke off the treatment.

As regards the 6 cases of fistula ani only 1 healed quickly. 2 severe cases healed only after 3—4 severe deep-going évidements and 1—2 years light-bath treatment. 2 cases improved considerably, and 1 case remained quite unchanged.

36 cases were controlled later, of which 26 for more than 12 months, and 7 for more than 3 years after conclusion of treatment. No relapse.

## History XXVIII

Julia A. 25 years old, spinster, servant. Nörre Sundby.

*Lupus faciei, colli, cavitat. nasi, fauchium, conjunctivae, antibrachii et pedis. Tub. subcut. cruris sin. Arthrititis tub. manus sin.*

Since 1906 lupus in the face. In 1910 came to Finsen Institute with lupus on the places indicated in the diagnosis. No improvement in spite of energetic local tight treatment etc. Since the spring of 1910 extensive tuberculosis in subcutaneous tissue of left crus. Local light treatment without any effect. Wound healed shortly after operative treatment, but broke out again with 2 fistulas.

In March, 1913, pains, tenderness and inspissation of lower end of left ulna, and grinding in the radio carpal joint. *Roent. picture* showed periosteal covering, strong illumination of lower end of ulna and lesure of the joint-line of ulna.

Light-baths daily from  $21\frac{1}{8}$  13— $23\frac{1}{5}$  14, in all 119 baths, and from  $9\frac{1}{6}$  14— $21\frac{1}{11}$  14 100 light-baths. In 1915 she received 25 and in 1916 she received 86 light baths. In Dec. 1913 left crus was healed, and has remained so since. On  $23\frac{1}{8}$  14 completely free motility in left wrist. No pains or tenderness. A *Roent. picture* taken later showed normal conditions. In the autumn of 1914 lupus in the skin appeared to be cured whereas slight lupus remained on the mucous membranes, for which reason she was treated with light-baths 1915—1916. Has kept well since. Last controlled in the autumn of 1920.

*Tendosynovitis Tuberculosa*

Of uncomplicated cases 8 patients were treated, of whom really only one recovered 'eclatant', and that was the first patient we treated. It was a question of a woman who had relapse after operation. The 7 other patients did not re-act at all, or only very badly, to the light-bath treatment, so that one quickly proceeded to roentgen treatment, which in most cases produced slow improvement.

Of complicated cases 8 were treated, of whom 7 were over 15 years. They were all of 6 months' standing. The 7 had previously been operated on. One broke off the treatment. 7 patients healed. 2 died later, one of whom no doubt of tuberculosis. 5 patients have since been controlled. 3 of whom for more than 12 months after conclusion of treatment. No relapse.

*Peritonitis Tuberculosa (uncomplicated cases)*

8 patients were treated, of whom 4 were over 15. There were 4 cases of peritonitis, 3 of tuberculous lymphoma, and 1 case of ileo-caecal tuberculosis.

5 of the patients had been ill for more than 6 months before the light-bath treatment commenced, and none had been operated on before this. 6 patients recovered, of whom 3 had lymphoma, and 3 peritonitis. One patient with peritonitis got ileus, and was laparotomized



with loosening of numerous adhesions. After which rapid recovery and astonishingly quick return of health.

6 of the patients recovered were controlled; of whom 1 for more than 12 months, and 3 for more than 3 years after conclusion of treatment. In 1 case relapse was substantiated about 3 years after conclusion of treatment. This was a question of 1 of the patients with tuberculous lymphoma who incurred a large intraperitoneal abscess.

#### *Peritonitis Tuberculosa* (complicated cases)

7 patients were treated of whom 2 were over 15, and of whom 6 had been laparotomized. In 5 of these cases the diagnosis had been verified. All had been ill for more than 6 months. 4 patients recovered, 1 improved, and one remained unchanged. This perhaps was a case of ileo-caecal tuberculosis. Another patient who remained unaffected died 3 months after conclusion of treatment. All the 4 cured patients were controlled; 3 for more than 12 months, and 1 for more than 3 years after conclusion of treatment. No relapse occurred.

#### *Kidney and Ureter*

The unilateral operable kidney tuberculosis has not been treated with light baths at all, nor ought it to be so. On the other hand 2 patients with bilateral kidney tuberculosis have been treated, one of whom grew steadily worse and died later, while the other feels well so long as he takes light baths, but there is no question of any real improvement.

4 patients with more superficial post-operative fistulas after nephrectomy have been treated. They all healed quickly. Of 4 patients with deep fistulas or large tuberculous wounds after nephrectomy only 1 has been cured.

#### *Genitalia muliebris*

In my opinion the uncomplicated cases are not adapted for light-bath treatment. It has been tried in only 3 cases, of which the one, where tuberculosis had been diagnosed by a very experienced gynecologist, proved not to be of a tuberculous nature at an operation performed later. This illustrates how difficult it is with certainty to establish the diagnosis tuberculous salpingitis.

Fistula after adnexoperation with tuberculosis has been treated in 6 cases, of which 4 were closed. The one, however, only after light-bath treatment for 15 months. In 2 other cases there was also intestinal fistula, and as the general condition of the patients had improved a

good deal, resection of the intestine was performed, after which recovery. Relapse with strong infiltration in the small pelvis occurred in one of the cases without intestinal fistula.

### *Genitalia virilia*

3 cases of uncomplicated tuberculosis in epididymis have been treated, of which 2 recovered and remained well for 2 and 3 years. Of complicated cases 16 have been treated, of which 4 had fistula after epididymectomy, and 4 after exstirpation of the entire testis. 12 recovered, and 2 remained unchanged, but healed later after epididymectomy. 2 broke off the treatment. 12 were controlled; 6 for more than 12 months, and 4 for more than 3 years after conclusion of treatment. No relapse.

If one would judge of the results obtained with the treatment of all these patients, one must first remember that the patients are not recruited only from childhood, when tuberculosis of the bones often has a relatively favourable course, but are of every age, inasmuch as 70 % are over 15 years of age.

It must be further remembered that many of our patients, on account of lack of space and much against our wish, have had to be treated ambulant, as during the light-bath treatment they have lived in their, to a great extent, poor homes, and daily or every other day have had to be transported to the Institute, which has not always been to their advantage. Furthermore, it must not be forgotten that the hygienic conditions of the wards of the Institute have been far from fulfilling the demands which nowadays are made on hospitals, to say nothing of sanatoriums. Finally it must be emphasized that many of our patients (especially those with ostitis pelvis, coxitis, and spondylitis) had been ill for so many years that a priori any thought of recovery had to be excluded, but one thought it one's duty to make the attempt. When, nevertheless, we have attained results which in many directions are so extremely favourable — one need only point to the economic importance to the community of entire, or partial, motility in the articulations affected having been obtained in such a large percentage — this seems to me to speak strongly in favour of the powerful, curing effect of the light bath on patients with surgical tuberculosis; and I think one is entitled to hope that the results attained will become still better if we some day get what is so badly needed in this country, viz., one or more coast hospitals for patients of all ages with surgical tuberculosis, where the curing effect of the light bath may be combined with the generally known resources at the disposal of such a sea-side hospital; and to the authorities who control expenditure it is necessary to maintain that *not*

only humane but also social economic consideration makes it highly desirable that such a hospital should be founded as soon as possible. Experience at the Institute shows that the majority of these patients can become quite capable of work, while with general operative treatment they are to a great extent exposed to getting stiff joints or permanent fistulas, with subsequent reduced working ability, constant medical help, and greater chance of tuberculosis in a fatal form.

The management of such a hospital should be placed in the hands of a surgeon, who has familiarized himself with orthopedics and light-bath treatment as well as with the general conditions of tuberculosis. It must be well remembered that even if the modern treatment of surgical tuberculosis is conservative, serious acute surgical complications (pyarthrosis, ileus) may at any time arise, which require prompt operative action. As a surgeon with such qualifications is not usually to be found, it would be desirable that the man who got such an appointment should receive 6 months' leave on full or double pay, in order that he might seek a supplementary training.

In order better to give an idea of the value of the results obtained by us, I will with a couple of groups make a comparison with the results obtained by ROLLIER, calling to mind, however, that the majority of his clientele is well-to-do, and treated under favourable outside conditions in stationary clinics.

I take the figures from ROLLIER's book »La cure de soleil», edition 1915.

*Ankle-joint tuberculosis:* Of 94 cases, complicated ROLLIER designates 87 (92 %) as recovered, but under ankle-joint tuberculosis he includes the cases of osteitis in calcaneus and tarsus-metatarsus, which have a far more favourable prognosis than the cases which I include, viz., tuberculosis round talus. Of my 47 cases 36 (or 76 %) healed with motility, and if we include those without motility or with only a few degrees of this the recovered number 42 (89 %).

*Elbow tuberculosis.* Of 30 cases, complicated and uncomplicated ROLLIER designates 20 (66 %) as healed with motility and 8 without.

Of my 48 cases of elbow tuberculosis 40 (83 %) healed with motility and 5 without, while 3 remained unchanged.

If in conclusion I attempt to state which cases of surgical tuberculosis adapt themselves to light-bath treatment this will be most easily done by recapitulating the cases which have proved refractory. These are the uncomplicated tendosynovitis cases, and the very old fistulous bone affections in columna, pelvis, and coxa, while the later cases (of about 12 months' standing) are not particularly unfavourable to treat.

As regards the knee I have become more reserved in my treatment of adults, with whom a fixed condition of flexion has already set in,

or where there are very severe capsular changes. Here, however, it will in many cases end in resection.

Slight tuberculosis of the lungs is no counter-indication for light-bath treatment, but one must of course consider the general state of health, especially the condition of lungs, heart, and kidneys.

I think that even now we must be cautious in defining the indications too sharply, because it is my conviction that in the future the results will be still better, when those most seriously affected can be admitted in greater numbers as lying-in patients, and this, moreover, may happen in the large new building which, largely thanks to Dr. REYN's energetic endeavours, has been built in Rosenvænget.

## Summary

At the Finsen Medical Light Institute in Copenhagen on the initiative of Doctor REYN »Finsensbaths» (Carbon arc-light-baths) have been employed since 1913 for treatment of patients suffering from lupus or surgical tuberculosis.

In all 439 patients suffering from surgical tuberculosis have been treated, 158 cases of uncomplicated tuberculosis with 145 patients and 396 cases of tuberculosis complicated with abscess or fistulas with 294 patients.

The results of the treatment have been remarkably good.

In 158 cases of uncomplicated tuberculosis in joints and bones 12 have broken off the treatment. Of the rest (146) 122 or 83 % were cured (88 with free movement, 18 with partial movement, 5 without movement) 5 were improved and only 19 were unchanged.

In 396 cases of surgical tuberculosis complicated with abscess or fistulas 24 have broken off the treatment and 10 have died under treatment. Of the remaining (362) 332 or 91 % were cured (255 with free movement, 55 with partial movement and 22 without movement). 15 were improved and only 25 were unchanged.

As regards the results, one may remember that the greater part of the patients are adults (only less than  $\frac{1}{3}$  are recruited from childhood) and further many of our patients have been ill for so many years, that a priori any thought of recovery had to be excluded. Furthermore it may be remembered that many of our patients on account of lack of space and much against our wish, have had to be treated ambulant, and during the treatment they have lived in their extensively poor homes.

The best results are obtained in cases of tuberculosis in hand, foot and elbow-joint, also in all forms of otitis both complicated and uncomplicated.

The cases which have proved refractory are the uncomplicated tendosynovitis, and the very old fistulous bone affections in columna pelvis and coxa.

## Résultats de notre traitement de la lymphadénite tuberculeuse par les rayons X, à Lund, de 1908 à 1918

par

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On ne peut nier que la lymphadénite tuberculeuse doive être considérée seulement comme une des nombreuses manifestations d'une infection tuberculeuse plus ou moins étendue dans le corps humain, mais il faut d'autre part relever le fait que cette maladie au point de vue clinique, peut malgré tout, dans la plupart des cas, être envisagée comme une maladie *locale* ou *limitée* à certaines régions, et n'est souvent que l'unique manifestation extérieure de cette infection. Si le traitement général de l'organisme en entier ne doit point être négligé dans les cas de cette nature, c'est cependant la thérapie *locale* qui joue le rôle principal. Par là je pense tout particulièrement à la lymphadénite tuberculeuse du cou qui représente sans comparaison la localisation la plus ordinaire de la tuberculose du système lymphatique. Si je donne dans ce qui suit un compte rendu de la thérapie employée par nous à Lund pendant 10 ans, de 1908 à 1918 avec la lymphadénite tuberculeuse, j'estime, pour les raisons ci-dessus mentionnées pouvoir passer sous silence le traitement général, et limiter mon exposé à la thérapie locale et spécifique, et me borner à ne parler que de la lymphadénite tuberculeuse du cou.

Au commencement de la période indiquée, le traitement des adénites tuberculeuses était, comme on le sait, le domaine propre de la chirurgie moderne. La méthode principale était une extirpation radicale, une opération chirurgicale développée dans ses moindres détails, qui ne semblait guère permettre de développement ultérieur et qui paraissait tout indiquée, tant dans les processus intracapsulaires que dans l'adénite étendue avec périadénite. Par contre, les interventions que l'on appelait conservatrices, c'est à-dire les incisions avec curettage, ponctions, éventuellement combinées avec des injections d'antiseptiques tels que: émul-

sion d'iodoforme, chlorure de zinc, thymol camphré etc., selon la méthode de CALOT, étaient réservées au traitement des ganglions solitaires avec suppuration ou avec fistules. Pour indiquer le rôle important que jouait la chirurgie des adénites dans nos hôpitaux à cette époque, il me suffira de dire qu' à la clinique de Lund en 1908, il n'y eut pas moins de 7 % du nombre total des opérations qui furent faites sur des lymphomes tuberculeux, chiffre qui n'est dépassé que par les opérations d'appendicite ou de hernie, ainsi que par les interventions dans la tuberculose des os et des articulations.

Dix années plus tard, soit en 1918 ce chiffre avait baissé jusqu'à 1 %, donc un changement radical tant dans l'acception absolue que relative si l'on songe au développement considérable que la chirurgie en général a traversé pendant cette période. Nous devons en chercher la raison dans l'éclosion et le développement d'une nouvelle méthode de traitement des adénites, la *radiothérapie*, qui, à Lund et ailleurs, a peu à peu, remplacé la chirurgie. Je ne puis aborder ici en détail le développement général du traitement par les rayons X des adénites tuberculeuses du cou, mais je renverrai le lecteur aux exposés donnés par les manuels. Je me bornerai à rappeler que les premières communications sur les essais de ce genre nous sont venues d'Amérique (WILLIAMS, PUSEY, 1902) et que cette méthode a été adoptée en Europe en premier lieu par les Français (BERGONIÉ, 1905, ensuite BARJON, RÉDARD et autres).

Dans les pays de langue germanique, elle est mentionnée d'abord par HOLZKNECHT et WETTERER; en Suède elle a été inaugurée par FORSELL (1906). Après avoir occupé d'abord une place relativement effacée, cette thérapie s'est imposée de plus en plus à l'attention des spécialistes, grâce à la publication des recherches de HEINEKE et de ses successeurs concernant l'influence de la lumière Roentgen sur les tissus lymphatiques du corps, recherches qui firent époque. Du côté clinico-chirurgical par contre, l'attention ne s'est portée sur cette méthode qu'à la suite des publications d'ISELIN, qui livraient pour la première fois au public savant et au jugement critique un ensemble de cas traités avec succès. Actuellement, le traitement des lymphadénites par les rayons X constitue une partie essentielle du travail dans la plupart des instituts radiothérapiques importants. Comme son histoire ultérieure coïncide essentiellement avec l'histoire de la technique du traitement et de son développement, je me vois obligé de dire d'abord quelques mots de cette histoire, en me restreignant, pour éviter les redites, aux traits principaux de ce développement, tels qu'ils sont présentés dans notre institut de Lund.

Pendant les premières années, de 1909 à 1912, on a suivi ici une modification de la méthode de KIENBOECK, appelée *méthode expéditive*.



Nous employions alors des tubes diagnostiques ordinaires, d'une file d'étincelles parallèle, de 12 à 15 cm., avec distance focale de 24 cm., et nous filtrions la lumière par des plaques de cuir, de caoutchouc, ou bien par une feuille d'étain. Un peu plus tard, on introduisit des filtres en aluminium d'une épaisseur de 1 mm. Le dosage se faisait au moyen du radiomètre SABOURAUD, et pour mesurer des doses inférieures à 5 H on se servait, à l'exemple de FORSELL de l'échelle BORDIER, bien qu'ayant les réactifs à mi-distance focale. La dose d'érythème se trouve alors entre les teintes II et III de l'échelle. Dans les cas d'adénite nous n'avons cependant jamais employé à la fois des doses aussi fortes, mais nous nous sommes contentés d'administrer des doses *superficielles* pour commencer de 2 H, ensuite de 3 ou 4 H, répétées à des intervalles d'une semaine d'abord, de 12 à 15 jours ensuite.

Le plus souvent, toute la région ganglionnaire était exposée au rayonnement en *une* séance, et seulement en cas de tumeurs fortement proéminentes la méthode du feu croisé, recommandée par KIENBOECK, était employée. Le procédé préconisé par plusieurs auteurs, entre autres par ISELIN pour chercher à diminuer la radiosensibilité *de la peau* par l'anémie par pression selon G. SCHWARZ, n'a pas trouvé d'application chez nous, non plus que les tentatives de provoquer l'hypérémie du *paquet des glandes elles-mêmes* au moyen de diathermie ou de stase suivant BIER et autres, afin d'augmenter par là les effets des rayons X. La technique que nous avons suivie, ne diffère pas particulièrement de celle pratiquée à cette époque par WETTERER, BAISCH, FRITSCH, ISELIN dans ses premières années, et par d'autres encore.

Vint l'année 1913 qui vit naître la thérapie pénétrante moderne introduite par l'école de Fribourg. Ce fut avec une certaine circonspection qu'à Lund nous nous rangeâmes aux nouveaux principes. Durant les années 1913 et 1914, je me suis servi d'abord d'une méthode transitoire, en augmentant la filtration jusqu'à 2 à 3 mm d'aluminium, tandis que le réactif continuait à être placé à mi-distance focale *au-dessus* du filtre; le dosage se faisait empiriquement et nous administrions généralement de 2 à 3 doses Sabouraud le même jour ou réparties sur plusieurs jours, après quoi nous laissions s'écouler 3—4 ou 6 semaines avant d'avoir recours à un nouveau traitement.

Au cours des années 1914—1915, je passai finalement à la technique du traitement profond, alors complètement au point et je l'ai conservée depuis dans ses parties essentielles pour le traitement des lymphadénites. La filtration a été augmentée jusqu'à 3 ou même 4 mm d'aluminium et un *filtre secondaire* en coton, cuir, ensuite un essuie-mains en toile pliée, devint obligatoire. Comme moyen de dosage, nous continuâmes d'utiliser les réactifs Sabouraud, placés maintenant sur la peau et contrôlés au

moyen de la nouvelle échelle de HOLZKNECHT. Plus tard l'intensimètre de FÜRSTENAU fut introduit. Pour gagner du temps la distance focale fut réduite, à 18—20 cm. comme dans plusieurs autres instituts (ainsi chez PETERSEN à Kiel). Parallèlement avec la filtration, les doses augmentèrent quelque peu, de sorte que la dose marquée sur le réactif sous 3 mm. d'aluminium atteignit d'abord 1 1/2 H., ensuite 2 à 3 H, ou sous 4 mm. d'aluminium 4 ou 5 H., cette dernière dose dans les cas de ganglions particulièrement profonds ou spécialement résistants. C'est seulement par exception que nous sommes allés plus loin; j'y reviendrai plus tard. En règle générale, les enfants n'ont pas reçu plus de 2 à 3 H.

Entre les différentes séries de traitement, il y avait des intervalles de 3 à 4 semaines, parfois davantage — Voir ci dessous.

Par comparaison, je mentionnerai que ISELIN, malgré l'introduction de la technique profonde et de crainte de lésions par les rayons X, continue d'user de précaution dans son dosage et ne dépasse pas 2 1/2 H avec les enfants au dessous de 6 ans; 3 1/2 H. pour les adolescents jusqu'à 15 ans; 5 H pour les adultes. WETTERER de son côté recommande depuis 1914 des doses de 10 H pour les adultes, 6 H pour les enfants.

Nous nous sommes donc bien trouvés en nous servant de doses relativement modérées pour le traitement des lymphomes et nous n'avons pas eu de raisons de suivre les conseils, formulés plus tard, d'avoir recours dans cette thérapie à la filtration de zinc d'après WINTZ avec augmentation correspondante des doses de rayons. Une semblable technique est cependant chaleureusement préconisée, par exemple par DISSON à la «Maison Samaritaine» de Heidelberg dirigée par WERNER. Celui-ci emploie actuellement presque exclusivement des filtres de zinc de 1/2 mm., des ampoules d'une file d'étincelles de 35 à 45 cm., et des doses de rayons qui ne se distinguent en rien de celles utilisées pour les tumeurs malignes: ainsi il recommande pour les adultes 50, pour les adolescents, âgés de 12 à 15 ans, la moitié de cette dose, pour les très jeunes enfants 1/3 à 1/4 de la même dose.

Même avec des filtres d'aluminium de 3 mm., il affirme se servir de doses de 30 à 40 H. On est tenté de croire qu'il y a ici un erreur de mesure, ce qui n'est pas sans exemple dans de pareilles indications de dosage. DISSON prétend toutefois que de grands paquets de ganglions avec périadénites, de même que d'anciens ganglions résistants avec fistules, disparaissent beaucoup plus facilement et plus complètement au moyen de cette technique. Des expériences identiques sont communiquées par RAPP qui cependant fait usage d'un dosage un peu plus modéré. Comme ces travaux ont été entrepris pendant les dernières années de la guerre et que des observations sur des lésions secondaires possibles, causées par les



rayons X, ont à peine pu être menées à bonne fin et en tous cas n'ont pu être publiées, il serait, selon moi, plus sûr d'attendre les résultats de cette technique.

Il n'est point opportun d'entrer ici dans les détails de l'anatomie pathologique et de l'étiologie des adénites tuberculeuses. Quant à l'ensemble des phénomènes morbides, il est dominé par les altérations *locales*, tandis que les symptômes généraux manquent ou ne paraissent que lorsqu'une suppuration se produit. En groupant mes observations, j'ai préféré garder la classification du processus en usage depuis longtemps dans la clinique, c. à. d. trois périodes de maladie et j'ai pour cela suivi la terminologie utilisée par Most.

Je distingue ainsi: D'abord la *première* phase d'une simple hyperplasie ganglionnaire tuberculeuse, ensuite la *seconde* phase avec formation de grands paquets ganglionnaires et de périadénite, mais sans suppuration et enfin une *troisième* phase caractérisée par de la suppuration, des fistules et éventuellement une intrusion dans la peau (scrofuloderme).

Quelques auteurs (KIENBÖCK, BAISCH, PETERSEN et autres) placent dans le second groupe les lymphadénomes avec caséation ou suppuration, et dans le troisième groupe les processus fistuleux et ulcéreux, classification que je trouve assez peu adéquate, car ces deux phases ne sont pas séparées essentiellement; du reste, on ne peut diagnostiquer cliniquement avec certitude ni une nécrose caséuse ni le commencement de la suppuration centrale. D'un autre côté, il faut avouer que les limites, tant de l'une que de l'autre classification, sont assez souvent flottantes.

Avant de passer à un examen détaillé des résultats obtenus chez nous, il ne serait pas hors de propos de dire quelques mots concernant la *nature et l'action des rayons X* sur la lymphadénite, dans la mesure où celle-ci nous est connue. La possibilité de cette action thérapeutique dépend du fait que le tissu lymphatique, de même que le tissu granuleux spécifiquement tuberculeux, est plus sensible à la lumière Roentgen que la couche supérieure de la peau et que le tissu sous-cutané conjonctif. Pour les lymphadénites tuberculeuses prises comme unité, la résistance à la lumière Roentgen non filtrée est à peu près celle de la peau considérée schématiquement (WETTERER).

Les rayons X opèrent *directement* sur le *tissu lymphoïde* ou *épithéloïde*, entravent l'activité cellulaire et causent la désagrégation des noyaux cellulaires et la destruction des cellules (HEINEKE). Environ 15 jours plus tard le tissu ainsi détruit est remplacé par la production, de fibroblastes qui naissent de la zone environnante et provoquent un processus d'organisation. Les plus résistantes à la destruction sont les cellules géantes mais même celles-là sont à la fin détruites, de sorte qu'il ne reste

finalement qu'un tissu conjonctif qui entoure et embrasse les nécroses centrales quand il y en a (BAISCH, KRALL).

Ce processus d'organisation et de rétrécissement dure longtemps et doit être, aidé peut-être, pendant un traitement prolongé, par l'action des rayons sur les vaisseaux nutritifs du tissu environnant.

Même les masses caséeuses peuvent, d'après ISELIN, être peu à peu résorbées. Il ne se produit par contre aucune action directe sur les bacilles tuberculeux, ce qui a été prouvé par les recherches de KRALL qui a trouvé des bacilles virulents dans des masses caséeuses exposées au rayonnement; ceci explique les récives dans des cas paraissant entièrement guéris. Généralement les bacilles restent inoffensifs, ayant perdu, grâce au rayonnement, le terrain nécessaire à leur développement.

Parallèlement au traitement par les rayons X, ISELIN a pesé ses malades régulièrement et a trouvé que le corps augmente continuellement de poids en même temps que la masse du tissu tuberculeux diminue. Il en conclut à un désempoisonnement du foyer tuberculeux qui influerait à son tour sur l'organisme en ce que, à côté de la résorption et de la dissolution des masses caséeuses, se formeraient dans le sang des anticorps qu'il suppose capables de produire une sorte d'auto-vaccination. Toute cette explication que l'on retrouve dans une grande partie de la littérature médicale allemande doit être considérée comme pure hypothèse, sur l'exactitude de laquelle nous ne savons absolument rien.

Il est cependant exact qu'il se produit une *action indirecte* sur l'organisme pendant le traitement, action qui se manifeste par une amélioration de l'état général, par la disparition de la fièvre, s'il y en a, par une augmentation de poids, tout cela à condition que l'organisme ne soit pas affaibli au point d'être incapable de réagir, ainsi que cela peut arriver dans le cas d'une tuberculose pulmonaire simultanée et étendue. Mais dans des cas de ce genre, un traitement local de la lymphadénite est aussi inutile.

L'évolution clinique de l'action du traitement apparaîtra plus distinctement si nous considérons chacune de ces trois phases en elle-même.

En ce qui concerne les lymphomes simples hyperplastiques, la plupart des auteurs constatent comme très ordinaire une réaction initiale facile à observer pendant les heures qui suivent le traitement et se manifestant par une enflure de la partie exposée au rayonnement, jointe à une sensibilité, parfois à une rougeur et quelquefois à une légère fièvre. J'ai encore remarqué, quoique rarement, et surtout pendant le traitement d'enfants ou de jeunes filles au système vasculaire sensible, cet ensemble de symptômes. J'en suis arrivé à croire que nous n'avons point affaire à une réaction du tissu tuberculeux des lymphomes proprement dit, mais à une espèce d'*oedème* provenant sans doute d'une altération des vais-

seaux sanguins sensibles de la peau, peut-être aussi à une irritation provoquée par une désagrégation rapide des tissus lymphoïdes. Un certain nombre de malades se plaignent encore de sécheresse dans la bouche, probablement par suite d'une action sur les glandes salivaires arrêtées dans leur fonction, peut-être aussi à cause d'un oedème analogue à celui indiqué plus haut. Tous ces symptômes sont ordinairement de courte durée. Jusqu' à quel point BAISCH a raison de soutenir que cette réaction initiale se produit très facilement surtout chez des enfants scrofuleux, ainsi que dans les cas où Pirquet est nettement positif, je ne saurais le dire, car je n'ai pas eu jusqu'à présent l'occasion de tenter cette réaction sur une clientèle généralement passagère.

L'action proprement thérapeutique du rayonnement apparaît dans une diminution des ganglions, ce que j'ai toujours constaté, contrairement à l'opinion d'autres radiologistes, être un processus lent à se développer et ne pouvant parfois être observé qu'à la suite de traitements réitérés. Il se produit le plus vite dans les cas des lymphomes mous, nouveaux, qui ont surgi rapidement, et *indépendamment de leur grosseur*. D'un autre côté il y a, fréquemment, des ganglions plus anciens qui, même s'ils sont petits et nettement délimités, ont généralement une résorption beaucoup plus lente, sans doute par suite d'une induration déjà avancée. Dans des cas analogues, je laisse volontiers, de même que PETERSEN, par exemple, de plus longs intervalles, de deux à trois, jusqu'à six mois, pour ne pas fatiguer inutilement la peau par de fréquentes irradiations. Les ganglions durs, plus ou moins anguleux des sous-maxillaires, résistent souvent au traitement le plus fort à doses relativement élevées. Ici il est probable que la mâchoire inférieure joue un rôle de protection contre les rayons; on peut aussi attribuer à une sclérose avancée ce manque de capacité de réaction.

Dans plusieurs cas, le résultat du traitement est une disparition complète des lymphomes, mais dans la majorité des cas, on observe, après le traitement, de petits *restes de ganglions*, durs et fibreux, qui ne se laissent plus influencer. Ils peuvent être de la grosseur d'un grain de blé, d'un haricot ou d'une noisette, selon le volume et la nature primitifs des ganglions. BAISCH en faisant l'excision de semblables papilles a trouvé qu'elles consistaient en un tissu fibreux, parfois entremêlé de parties caséeuses, mais sans tissu tuberculeux ou lymphatique. On peut donc être justifié en les considérant comme des cicatrices sans autre signification clinique, et regarder ces malades comme guéris.

La moyenne de *durée du traitement* jusqu'à ce que ce résultat ait été obtenu, a été calculée par moi, pour ce premier groupe, à environ 6  $\frac{1}{2}$  mois. Ce chiffre est basé sur 36 cas traités avec doses d'une telle continuité qu'un semblable calcul pût être fait.

Venons en maintenant aux cas appartenant à la *seconde phase*, caractérisée ainsi qu'il a été dit ci-dessus, par *formation de périadénite* étendue, causée par l'extension des altérations tuberculeuses jusqu'aux parties subcapsulaires des lymphomes. Par suite de ce processus, les ganglions se joignent, formant des paquets plus ou moins grands, dans lesquels les ganglions particuliers ne peuvent souvent pas être palpés séparément. Ces paquets de ganglions se trouvent généralement tout près sous l'oreille ou derrière l'angle de la mâchoire où aboutissent les vaisseaux lymphatiques des principales voies d'infection de la maladie en question, les muqueuses de la bouche et du nez. On trouve aussi dans des cas de ce genre des groupes de lymphomes de formation plus nouvelle, parfaitement mobiles, localisés d'habitude dans les parties inférieures du cou. Ces paquets massifs contiennent très souvent des nécroses caséuses étendues ou même des suppurations centrales, quoiqu'il ne nous soit pas possible d'en poser un diagnostic clinique certain dès leur origine. D'un autre côté, nous pouvons avoir affaire dans un certain nombre de cas à des altérations fibreuses et atrophiées, souvent difficiles à discerner.

C'est au contraire par *l'évolution de la radiothérapie*, que nous arrivons à connaître le caractère des altérations pathologiques et anatomiques. Au total, j'ai l'impression nette qu'il est plus difficile d'influencer les cas de ce groupe que ceux du groupe précédent. Il arrive souvent que la périadénite disparaît très vite; les ganglions peuvent alors être palpés séparément, diminuent et même disparaissent. Dans des cas de ce genre, nous trouverions, selon toute probabilité, principalement du tissu *lymphoïde* hyperplastique et des *tubercules* comme éléments histologiques des ganglions. Ainsi, j'ai observé que des tumeurs plus grosses qu'un oeuf ont pu être réduites en deux ou trois mois à des résidus à peine perceptibles. D'un autre côté, parmi ma clientèle, les cas ne sont point rares où même après plusieurs années de traitement, l'action n'a été que partielle. Ici l'on pourrait soupçonner une *induration fibreuse* ou *nécrose caséuse* qui, ainsi qu'il a été mentionné ci-dessus, prend un temps très long pour s'atrophier ou se résorber. Si, quelque temps après une irradiation, il se produit dans une semblable tumeur ganglionnaire une suppuration, le cas n'appartient plus à cette catégorie, mais à la suivante.

La durée du traitement ayant été fort différente, il est difficile d'indiquer dans ce groupe une *moyenne* quant à la durée du temps nécessaire à la guérison, mais je crois pouvoir la fixer approximativement à huit mois, à en juger d'après les cas appartenant à ce groupe que j'ai pu examiner dans ma clientèle.

Il me reste maintenant à dire quelques mots de l'adénite suppurée, fistuleuse et ulcérée, qui forment ensemble le *troisième* et le plus grand groupe de mes malades.

Que la radiothérapie *facilite* ou *hâte* le commencement de la suppuration dans les ganglions qui ont tendance à suppurer, c'est un fait généralement reconnu et signalé par la plupart des auteurs. Cette modification peut se produire tant dans les cas de lymphomes volumineux croissant rapidement et mobiles, que dans les cas appartenant au groupe mentionné en dernier lieu. J'ai très souvent observé, moi aussi, que très peu de temps après le commencement du traitement, même après une *seule* séance, la suppuration s'est produite dans des cas où je n'ai pu trouver d'autre raison à la suppuration que l'irradiation elle-même. Si je remarque un commencement de suppuration, j'attends d'habitude qu'elle soit complète et se rapproche de la peau, mais pas assez pour que celle-ci en soit altérée. Dans les cas favorables, je fais volontiers des *ponctions* de préférence dans la peau saine. Après quelques ponctions et des irradiations renouvelées, la sécrétion devient de plus en plus séreuse et il peut arriver que la suppuration s'arrête, que l'abcès sèche et que l'intervention chirurgicale soit ainsi réduite au minimum.

Dans d'autres cas, peut-être les plus nombreux, la suppuration cependant continue. Je fais alors une *incision* à la place la plus déclive, sous ivresse éthérée, éventuellement sous anesthésie locale provoquée par le chlorure d'éthyle, et je fais un curettage radical du contenu caséeux en essayant de parvenir dans les recoins de la cavité de l'abcès qui est toujours plus grande qu'on ne s'y est attendu. Inutile de faire observer que l'ouverture pour l'incision doit être aussi petite que possible.

Je n'emploie guère le tampon que le premier ou les deux premiers jours après quoi la fistule peut se fermer. Je n'ai pas trouvé d'avantage à employer des injections de glycérine iodoformée ou d'autres liquides, aussi n'ai-je point fait de suture primaire de la plaie ainsi que BAISCH et autres, ce qui me paraît assez inutile. Après une semaine le malade peut souvent se passer de pansement. Le curettage doit aussi être répété à maintes reprises, et il me paraît que le traitement Roentgen a pour résultat que les résidus des capsules des ganglions se détachent et sont plus facilement enlevés avec la curette que ce n'est le cas ordinairement.

Dans les cas au contraire, où il existe déjà des fistules et de la scrofuloderme, j'ai l'habitude de commencer le traitement en enlevant par curettage toutes les masses ganglionnaires. Les plaies se purifient ensuite par l'irradiation, généralement assez vite, sèchent et s'épithélisent. Les cicatrices qui subsistent après ces fistules et ces plaies se distinguent la plupart du temps favorablement de celles qu'on voit habituellement après un traitement exclusivement chirurgical; elles sont souples, planes et ordinairement pâles et n'ont généralement pas de tendance à former

des chéloïdes et des »traverses» d'épithélium, qui sont disgracieuses. Les cicatrices spécialement à la suite des incisions primaires, deviennent dans les cas favorables, (et ceux-ci ne sont pas rares du tout), si fines, qu'on peut à peine les découvrir sans un examen minutieux.

D'un autre côté la justice exige de relever que le résultat *cosmétique* dans les cas de suppuration opiniâtre et plusieurs fois répétée, peut parfois être moins favorable.

Les malades de la troisième phase, dans la littérature médicale ordinairement sont désignés comme étant les *moins appropriés* à la radiothérapie, surtout en raison du *temps prolongé* qui s'écoule habituellement avant que les cas de ce genre se mettent à guérir. (BAISCH indique plus d'une année, WETTERER 10 à 15 mois, DISSON 14 mois). Moi aussi j'ai constaté, chez mes malades, un temps de traitement plus long que dans les groupes précédents, mais il ne dépasse pas cependant en moyenne 8 à 10 mois, calcul fait d'après 76 malades dont le traitement a pu être suivi tant soit peu continûment. Comme j'ai, de plus, dans ce groupe un *pourcentage considérablement plus grands de guéris* que dans les autres groupes, je ne puis me rallier à l'opinion exprimée ci-dessus. Il me semble du reste que la suppuration ne doit nullement être considérée comme un résultat d'une valeur *qualitativement moindre*, puisque le malade est par là plus vite et plus radicalement débarrassé des masses caséeuses et par là d'une quantité de possibilité d'infection nouvelle. La suppuration est au contraire considérée dans beaucoup de cliniques comme un premier but qui doit être atteint.

Il n'est point rare qu'un abcès apparaisse relativement tard, après que le traitement a été appliqué un certain temps. C'est un fait connu qu'il est alors souvent lié à des maladies intercurrentes, refroidissements, angines etc.

Contrairement aux cas dont je viens de parler, je désire signaler un phénomène que je n'ai pas vu mentionné jusqu'à présent dans la littérature médicale et que je veux appeler une *suppuration retardée*. Chez 8 malades en tout, j'ai vu un abcès se produire *longtemps après la fin du traitement* (de 8 mois jusqu'à 5 ans après), et ceci sans qu'il se soit formé de nouveaux lymphomes, et en général sans aucune raison visible. Dans deux des cas il fut précédé de fièvre et d'une action sur l'état général pendant que les ganglions enflaient. Mais chez l'un de ces malades on enleva ensuite seulement quelques matières sèches calcifiées. Vraisemblablement il y a aussi dans ces cas une infection secondaire d'un genre ou d'un autre. Dans le dernier cas on pourrait cependant admettre une irritation directe provoquée par le contenu calcaire, — comme étant un corps étranger —, sur les parties incomplètement resorbées des ganglions.



J'arrive enfin à donner sous forme de tableau le résumé des *résultats* de notre radiothérapie de l'adénite tuberculeuse pendant 10 ans, tels qu'ils se présentent après une enquête faite l'été dernier. Le nombre des malades qui ont subi le traitement Roentgen est de 380. De là il faut déduire 94 cas, comme n'étant pas utilisables pour la statistique. Il reste donc 286 cas, dont 206, c'est à dire 70 %, ont répondu, ou bien en se présentant personnellement, ou bien par lettre selon un formulaire spécial.

Je désigne comme étant *guéris* dans le tableau I ceux des cas, chez lesquels on n'a pas trouvé de ganglions du tout, ou chez lesquels il ne se trouve que de petits résidus fibreux qui n'ont pas grossis après le traitement. Je fais usage du mot «guéris» bien que les résultats dans une partie considérable des cas ne sont pas plus vieux que 2 à 4 ans, ayant trouvé que des récidives *in loco* peuvent parfois se produire même au bout de 5 ans. Parmi ceux dont l'état s'est *amélioré* sont comptés, et les cas dans lesquels la diminution des ganglions ne s'est point produite à un degré tel qu'on puisse parler de guérison, et les cas qui ont interrompu trop tôt le traitement ou qui se sont fait opérer pour une raison ou pour une autre après qu'une réduction considérable des ganglions se fut produite, et enfin une série de cas de ces dernières années dont le traitement n'est point achevé. Comme *récidives* par contre j'ai compté aussi les petits et insignifiants lymphomes nouvellement survenus, à condition qu'ils se soient produits dans l'entourage de la région anciennement soumise au traitement. En ce qui concerne les *morts*, 5 ont succombé à la tuberculose pulmonaire, 1 à une

Tableau I

| Nombre total   |     | Guéris | %    | Améliorés | %   | Récidives | %   | Morts | %   |
|----------------|-----|--------|------|-----------|-----|-----------|-----|-------|-----|
| Groupe I ...   | 70  | 49     | 70   | 14        | 20  | 3         | 4.3 | 4     | 5.7 |
| Groupe II ...  | 32  | 18     | 56.2 | 9         | 28  | 2         | 6.2 | 3     | 9.4 |
| Groupe III ... | 104 | 88     | 84.6 | 6         | 5.8 | 9         | 8.6 | 1     | 1   |
| Total .....    | 206 | 155    | 75.3 | 29        | 14  | 14        | 6.7 | 8     | 4   |

Tableau II

| Nombre total      |     | Guéris | %    | Améliorés | %    | Non Améliorés | %    |
|-------------------|-----|--------|------|-----------|------|---------------|------|
| Groupe I .....    | 99  | 63     | 63.6 | 35        | 35.4 | 1             | 0.99 |
| Groupe II .....   | 103 | 70     | 68   | 24        | 23.3 | 9             | 8.7  |
| Total .....       | 202 | 133    | 65.9 | 59        | 29.2 | 10            | 4.9  |
| Groupe I—II, Lund | 102 | 67     | 65.7 | 23        | 22.6 |               |      |

méningite tuberculeuse, 1 à la grippe, (qui s'est produite aussi comme complication dans un des cas de phthisie pulmonaire ci-dessus mentionnés), et 1 à une autre maladie intercurrente.

Il est intéressant de comparer le résultat ci-dessus indiqué (tableau I) avec les statistiques du même genre qui nous sont accessibles dans la littérature médicale. Je veux donc renvoyer d'abord au tableau II qui contient les résultats de traitement publiés en 1912 par ISELIN. Ces observations portent sur 202 cas, qui regroupés suivant la même classification que j'ai employée se présentent comme l'indique le tableau. Le groupe I d'ISELIN correspond alors à mes deux premières phases réunies. Ces chiffres réunis sont cités, pour qu'on puisse faire la comparaison, au bas du tableau. Il est à remarquer que les cas d'ISELIN ont été traités au moyen d'un filtre de 1, ou au plus, 2 mm. d'aluminium, tandis que parmi mes cas seulement 19 (c'est à dire 8 %) ont été traités avec un filtre aussi mince. Si donc ISELIN veut maintenant faire valoir que les résultats obtenus par cette technique deviennent meilleurs, je ne puis le suivre; tous mes autres malades ont eu un filtre d'aluminium de 3—4 mm. d'épaisseur, et ces cas sont ceux qui sont décisifs pour les résultats des différents groupes.

D'après une communication verbale, citée par MOST, ISELIN a eu de plus les résultats suivants pour des traitements de lymphomes pendant les années 1908—1914. De 551 malades 390 (= 70 %) furent guéris. Si cependant on ne compte que les cas dont le traitement était terminé à cette époque, ce serait 390 sur 433 c. à d. 90 % de guéris. Ce chiffre n'est cependant valable qu'en ce qui concerne le résultat *immédiat* du traitement. Quant aux *résultats définitifs*, ISELIN rapporte au même endroit (1917), qu'un examen ultérieur des cas traités pendant les années 1908—1912, c'est à dire de ceux qui furent traités jusqu'à la fin pendant 6 ans ou plus, a donné 11 % de *récidives* après une durée de 1 à 8 ans, dont 7,6 % les *trois premières années*, 3,6 % la quatrième année et aucune récidive après la quatrième année. Notre pourcentage moyen de récidives 6,7 peut donc être considéré comme assez satisfaisant et s'accorde du reste avec les résultats de Heidelberg où DISSON a eu 6 % de récidives sur un total de 158 cas avec 62 % de guéris. Nos résultats se présentent encore plus avantageusement, comparés à ceux publiés en 1912 par BAISCH, c'est à dire 50 % de guéris, 24 % d'améliorés, et 8 % de non-améliorés sur un total de 50 cas traités.

Quel est enfin le résultat de notre radiothérapie comparée à celui de la chirurgie? c'est la question qui doit exciter le plus d'intérêt et qui doit être de la plus grande importance pour notre thérapie à l'avenir. Nos chirurgiens citent ordinairement les chiffres mentionnés par BLOS à



Heidelberg qui se trouve dans la dernière édition du »Handbuch der Chirurgie» (JORDAN, Chirurgie des Halses).

BLOS a fait un vaste résumé des observations publiées provenant de 11 cliniques différentes, soit en tout 745 cas. D'après cela il compte comme *résultat définitif*, c'est à dire après 6 ans, 54 % de guéris, 28 % de récidives et 18 % de cas de mort. Dans la clinique de Heidelberg seule, BLOS a 73 % de guéris sur 82 cas.

Si d'après cette manière de calculer je prends mes cas des années 1909—1914, j'arrive à un total de 48 cas, c'est à dire pas tout à fait 25 % du nombre total. Parmi ces cas on peut en compter 37 comme définitivement guéris, donc pas moins de 77 %; 20 % ont subi une amélioration tandis que 3 % ont eu une récidive. Il est cependant à remarquer que ces observations proviennent de l'époque qui est caractérisée par la plus mauvaise technique et par le traitement le moins régulièrement effectué. Il est possible que le résultat, en d'autres circonstances, eut été encore plus favorable au traitement radiothérapique.

Cependant il faut à ce sujet énergiquement marquer ici que cette méthode de traitement a aussi ses *risques*. Il ne doit peut-être pas y avoir un radiologiste ayant pratiqué le traitement de la lymphadénite pendant la période que je citais tout à l'heure qui n'ait fait l'expérience fâcheuse que fit ISELIN et dont il rend compte dans quelques publications de l'année 1912. Je veux parler des *lésions secondaires de la peau* occasionnées par les rayons X, qui peuvent survenir après un traitement avec des *filtres trop minces*, soit chez des malades qui ont auparavant subi une réaction Roentgen du 1<sup>er</sup> degré (c. à. d. un érythème) soit dans des cas où aucune réaction n'a eu lieu, mais où les irradiations ont été répétées au-delà d'une certaine limite. Ces changements apparaissent *longtemps après la fin du traitement*, de 3 mois à 1 1/2 an plus tard, et peuvent être de tous les degrés, à commencer par une légère atrophie jusqu'à de véritables »*ulcérations tardives*».

ISELIN a examiné de près les origines de ces lésions et le moyen de les éviter. Ainsi il a calculé qu'avec la technique employé jusqu'ici par lui, filtration par 1—2 mm. d'aluminium, distance focale de 24 cm. et ampoules de 6—7 Benoist, la limite tolérée pour la peau du cou se trouve à 8 Sabouraud (si l'on tient compte de taches pigmentées, alors même à 6 Sabouraud) et dans la région sus-claviculaire à 4 Sabouraud; avec une lumière non filtrée encore beaucoup plus bas. C'est à la suite de ces expériences qu'il en vint en principe à la technique pénétrante et qu'il a mis absolument en garde contre une filtration moindre. Il va de soi, qu'en traitant l'adénite par les rayons X, il faut posséder *complètement la technique* et tenir le plus grand compte de ces expériences.

Moi-même j'ai malheureusement à mentionner une série qui se monte à pas moins de 36 cas, où il s'est produit une *atrophie* de la peau et 8 cas où une *pigmentation* a subsisté mais sans autres altérations de la peau. Des lésions d'un caractère plus profond ne se sont heureusement pas produites. Dans les cas d'atrophie, à peu près la moitié des cas, soit 17 cas, ont été très légers, et présentent des altérations qui ne sont visibles seulement qu'à un examen très attentif; les autres cas au contraire montrent une atrophie plus forte ou plus étendue, avec de nombreuses télangiectasies. La majeure partie, ou 26 cas, appartient au 3:*me* groupe, c'est à dire à celui où le traitement a été le plus long, et qui a été traité pendant les années 1914, 15 et 16, c'est à dire les années pendant lesquelles la technique pénétrante s'est développée chez nous, mais où les expériences au sujet de son action étaient encore insuffisantes et par suite les doses variables et incertaines. La raison pour laquelle ces altérations ont pu se produire est la même que chez ISELIN: toute une série de cas fut traitée avec un *filtre absolument insuffisant* (2 mm. d'aluminium au plus). Les autres cas qui proviennent de la fin de cette période, ont reçu des *doses trop fortes* pour la filtration, qui en elle-même était suffisante. Tel fut surtout le cas d'une série de malades de 1916 qui, à titre d'essai, reçurent des doses plus fortes que celles que j'ai indiquées ci-dessus et que j'ai maintenues depuis. Heureusement ces effets secondaires qui sont regrettables appartiennent maintenant au passé; depuis 3  $\frac{1}{2}$  ans nous n'avons plus observé d'atrophie causée par les rayons X chez les malades, atteints d'adénite.

En se guidant par la statistique que je viens d'exposer on pourrait appeler la lumière Roentgen une arme puissante contre la lymphadénite tuberculeuse, un moyen qui est capable d'opérer la guérison chez un *plus grand* nombre de malades que l'extirpation chirurgicale.

Nous pouvons, de plus, conclure que l'effet de la radiothérapie est plus *radical* que celui du bistouri, vu que le pourcentage des récidives avec ce traitement est bien au dessous du pourcentage que donne le traitement chirurgical. La majorité des malades éprouvent comme un soulagement d'éviter le désagrément d'une intervention chirurgicale avec une longue narcose et suivie de la nécessité de garder le lit. Enfin on doit signaler que les résultats *cosmétiques* par la radiothérapie appliquée *lege artis* sont pour la plupart du temps meilleurs qu'après une grande extirpation, ce qui, surtout pour les jeunes femmes, est d'une grande importance. Ce que je veux surtout faire ressortir, c'est qu'avec la méthode radiologique on obtient de bons résultats dans la catégorie même de malades où la chirurgie peut obtenir *le moins* de résultats, à savoir dans les cas de lymphomés suppurants et ulcérés.

D'un autre côté il faut prendre en considération le préjudice marqué

qui est inhérent à la méthode Roentgen par suite de la *longue durée* même du traitement. Surtout pour des personnes assez peu aisées et pour des malades qui ont de longs voyages à faire, cela compte indiscutablement pour beaucoup. Mais il faut cependant considérer aussi que la radiothérapie se produit en règle générale à des intervalles d'au moins un mois, souvent de plusieurs mois, pendant lesquels les malades peuvent pour la plupart du temps vaquer à leurs occupations. Néanmoins, eu égard à cet inconvénient, je trouve qu'il faut juger plus strictement les indications pour la radiothérapie dans les cas où une simple intervention chirurgicale aurait la chance d'amener plus vite au but, comme par ex. lorsqu'il s'agit de lymphomes solitaires, mobiles, qui ne fournissent point d'indices de suppuration. En tous cas je pense qu'il faut exposer au malade les avantages et les désavantages des deux méthodes. De plus il faudrait avoir recours à l'opération dans les cas de *paquets de ganglions volumineux et profonds* pour lesquels, avec les rayons X, on n'arrive au bout de quelques mois qu'à un *résultat partiel*, tel que mobilisation et réduction des ganglions, mais où l'amélioration ne va pas plus loin. Par contre, une suppuration qui commence ne constitue pas en elle-même une contre-indication à la radiothérapie, bien au contraire.

Pour conclure je ne puis omettre de mentionner l'expérience acquise par nos voisins les Danois au sujet des avantages d'un traitement par les rayons X combiné avec des *bains de lumière électrique*. Ces derniers remplacent, comme on le sait, d'une manière particulièrement effective et précieuse les bains solaires dans la plupart des formes de tuberculose chirurgicale. Ceci est spécialement le cas dans notre climat du Nord, qui pendant une grande partie de l'année empêche l'utilisation des qualités thérapeutiques des rayons solaires. C'est tout particulièrement dans les cas pas trop rares de lymphadénite étendue, avec suppuration, fistules et granulations abondantes, souvent compliqués de tuberculose cutanée et d'une forte dépression générale, que les effets de ces irradiations généralisées, que comportent ces bains de lumière, seraient particulièrement avantageux.



## Résultats du traitement des hémorragies climatiques par la radiumthérapie dans la clinique de Radium\*

par

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Dans plusieurs domaines de la gynécologie, la radiothérapie a eu un effet révolutionnaire, cependant presque nulle part l'on n'observe un changement aussi brusque que lors du traitement d'hémorragies climatiques. On n'a qu'à parcourir 2 éditions aussi rapprochées que celles de 1910 et de 1915 du livre si connu de Runge sur la Gynécologie, pour trouver un exemple frappant de cette assertion.

1910. »Le traitement local par excellence de la métrite hémorragique, est le curetage de la muqueuse, opération qui, par son introduction dans la technique de la gynécologie, a provoqué une évolution importante de la thérapie et du diagnostic des affections de l'utérus.»

1915. »La Radiothérapie profonde est aujourd'hui le remède souverain dans le traitement des hémorragies qu'on ne peut vaincre par d'autres moyens.»

L'arme de prédilection des gynécologues, la curette qui, au service du diagnostic, conserve toujours sa grande importance, quand il s'agit du traitement des métrites hémorragiques, a perdu sa place souveraine et celle-ci a été prise par la radiothérapie. Le fait est si généralement admis qu'il n'est besoin d'aucune autre démonstration. Ce qui prête encore à discussion, ce sont des questions techniques, par exemple, laquelle des méthodes du traitement radiologique, le radium ou les rayons X, donne les résultats les plus satisfaisants.

J'avais espéré que les matériaux de la clinique de Radium seraient propres à éclaircir cette question, mais, lors de mes recherches, il se trouva que les sujets traités par rayons X étaient encore en nombre trop restreint pour que l'on pût établir quelques comparaisons. Mon exposé ne comprendra donc que les résultats obtenus par le traitement radium-thérapique de métrite hémorragique. Aucun compte-rendu analogue n'ayant paru précédemment en Scandinavie, j'ai cru que, en dépit du matériel

\* Discours prononcé au "Nordisk förening för medicinsk radiologi" à Copenhague, Septembre 1921.

relativement restreint, un aperçu de nos résultats pourrait éveiller un certain intérêt. Sous le nom collectif de »métrite hémorragique« sont réunies une foule de formes hétérogènes d'hémorragies utérines sans étiologie plus exactement connue. La plupart des cas où une hémorragie grave sert d'indication thérapeutique, appartiennent aux hémorragies dites climatériques. Les matériaux de la clinique de Radium comprennent presque exclusivement des cas appartenant à cette dernière catégorie et de 1916 à 1920, 57 cas en tout furent traités.

(La dernière limite de ce qui peut être compris dans les hémorragies climatériques est très flottante. Cependant je n'ai pas cru trop déroger aux lois du diagnostic en y faisant rentrer tous les cas, car 86.5 % des malades avaient 40 ans et davantage, donc, d'après l'usage reçu, elles appartenaient à la classe des climatériques. Les 7 restantes (= 13.5 %) sauf une, avaient de 35 à 40 ans).

Lors de recherches subséquentes, des 57 ci-dessus mentionnées, 5 ne purent être retrouvées, de sorte que le nombre de celles qui furent ensuite examinées se monte à 52. Outre les 5 disparues, j'ai seulement éliminé de mon rapport les cas de l'année 1921, car le résultat du traitement en question ne peut être indiqué avec certitude qu'après une année d'observation.

Dans ces 52 cas, il s'agit des hémorragies graves, d'abord traitées sans succès d'une autre manière et envoyées par le médecin à la clinique de Radium. Ceci est prouvé par les registres d'observations, entre autres, parce que 40 malades furent auparavant soumises au curettage; parmi elles, 21 subirent ce curettage 2, 3 ou même 4 fois et continuèrent à saigner après le curettage. Six sur les 12 restantes avaient été traitées médicalement avant et gardèrent le lit plus ou moins longtemps, dans certains cas ne prenant que des médecines. Concernant six de ces malades, les données manquent sur le traitement antérieur.

La totalité, de nos malades ayant été traitées d'après l'indication de ménorrhagie (parfois métrorrhagie) grave, il me paraît juste, en rendant compte de l'effet du traitement, de mentionner comme des résultats heureux, toutes celles qui, après le traitement, ont vu leur menstruation cesser complètement (aménorrhée) ou diminuer sensiblement (oligoménorrhée). Mais, par contre, d'envisager le traitement par le radium comme ayant échoué, lorsque un résultat analogue n'a pas été atteint après un *unique* traitement, est une manière de voir fausse, tout au moins jusqu'à ce que l'occasion se soit présentée d'appliquer les doses à un plus grand nombre de cas. A l'instar de plusieurs autres auteurs, je pourrais désigner les cas où un traitement répété a été nécessaire, sous le nom de »récidives«, mais le plus souvent, dans nos cas, l'hémorragie n'a jamais disparu ou elle a cessé durant un temps si court, que le

terme «récidive» me semble propre à induire en erreur. En conséquence, j'ai classé parmi les résultats heureux, même les cas où parfois le traitement dut être répété, mais plus loin, je donnerai un compte-rendu spécial des cas-là.

Me basant sur les points de vue ci-dessus énumérés, le résultat sera :

|                |          |          |
|----------------|----------|----------|
| aménorrhée     | — 32 cas | } 92.2 % |
| oligoménorrhée | — 16 »   |          |
| échecs         | — 4 »    | 7.7 %    |

Si nous étudions de plus près les 4 cas où le succès a été nul, il peut paraître douteux que l'échec provienne de la méthode employée. L'une des femmes était hémophile; après le traitement, ses règles sont toujours abondantes et de longue durée, mais son état s'est notablement amélioré. Une malade continua à saigner après le traitement; ici l'on poursuivit le traitement par le radium comme lors du cancer, (par suite d'un curetage suspect) avec résultat favorable. Dans un troisième cas, où l'hémorragie reparut après le premier traitement, l'on découvrit au début du second traitement un kyste de l'ovaire et la malade fut opérée. Le 4<sup>e</sup> cas seul me paraît, en pleine justice, devoir être classé parmi les échecs: après 2 séances et une année d'oligoménorrhée, l'hystérectomie abdominale subtotale dut être pratiquée, par suite de nouvelles et graves hémorragies. *Au fond, le traitement n'a donc échoué que dans un seul cas.*

Concernant le nombre des traitements l'on voit que :

|                               |        |          |
|-------------------------------|--------|----------|
| 1 traitement a été donné dans | 42 cas | (80.8 %) |
| 2 » » » »                     | 8 »    | (15.4 %) |
| 3 » » » »                     | 2 »    | (3.8 %)  |

A part les 3 cas compliqués, mentionnés plus haut, les chiffres correspondants sont :

|                   |        |
|-------------------|--------|
| 1 traitement dans | 41 cas |
| 2 » » » »         | 7 »    |
| 3 » » » »         | 1 »    |

Si maintenant, dans le jugement porté sur le résultat du traitement, nous appliquons la méthode qui envisage 2 ou 3 traitements comme «récidive», il faudra faire un nouveau calcul pour le dernier relevé. Parmi les 7 cas qui eurent 2 traitements, il n'existait dans 4 cas aucune autre indication pour un nouveau traitement que l'incertitude dans le dosage à ce moment-là. Ces 4 cas ne peuvent donc être considérés comme des «récidives» et doivent en conséquence être défalqués. Le tableau sera alors le suivant :

|                   |        |          |
|-------------------|--------|----------|
| 1 traitement dans | 41 cas | (91.1 %) |
| 2 » » » »         | 3 »    | (6.7 %)  |
| 3 » » » »         | 1 »    | (2.2 %)  |



Le résultat sera donc sur 45 cas:

|              |          |
|--------------|----------|
| 41 réussis   | = 91.1 % |
| 3 »récidive» | = 6.7 %  |
| 1 échec      | = 2.2 %  |

Quant à la technique lors de ces traitements, nous avons pris deux voies différentes, la première avec application intrautérine de radium, la seconde avec application vaginale. Lors d'application intrautérine, employée d'abord par FORSELL, on place, en observant une asepsie sévère, 3 tubes de radium (40 mgr RaBr<sub>2</sub>—19 mg RaÉl) l'un après l'autre dans un tuyau en caoutchouc qui est introduit dans la cavité utérine après dilatation avec des bougies d'Hegar jusqu'au No. 7, là où la chose est nécessaire. Ces tubes de radium dont l'épaisseur de la paroi correspond à 1 mm Pb, restent parfois de 16 à 20 heures (= 304—380 mgt RaÉl). Dans quelques cas (3) l'on a eu recours à un tube plus fort.

Quand il s'agit d'application vaginale qui fut d'abord employée par LUNDQVIST, lors du traitement du fibrome, l'épaisseur du filtre fut de 3 mm Pb. Ici la dose fut plus élevée et a aussi varié davantage. (1100—1700 mgt RaÉl).

Des 41 cas simples, traités une fois, 30 ont été traités intrautérinement et 11 vaginalement. Le résultat des deux méthodes est à peu près identique. Le seul cas d'insuccès appartient, il est vrai, aux cas intrautérins, mais il peut être dû au hasard et 9.1 % des »récidives» proviennent des cas intrautérins et 8.5 % des cas vaginaux traités. — — — Aucune des méthodes n'a provoqué de complications et il faut surtout faire ressortir le fait que, dans les cas intrautérins traités, il n'est jamais survenu d'inflammation péri-utérine ni rien d'analogue. Le traitement intrautérin occasionne parfois à la malade des malaises plus graves que le traitement vaginal. Au point de vue technique, tous deux sont également simples; là où la dilatation s'impose et rencontre de la résistance, le traitement intrautérin est plus pénible pour la malade.

Aussi longtemps que le résultat du traitement est également satisfaisant avec les deux manières d'application, la diversité dans l'exécution technique et le désagrément pour la malade est trop insignifiant pour que l'on puisse donner à l'une des méthodes la préférence absolue sur l'autre.

Les diverses possibilités d'un dosage exact, offertes par l'une des méthodes, me paraît plutôt faire pencher la balance. Il est certain que la distance de la cavité utérine aux ovaires est plus constante que celle du cul-de-sac du vagin. De là découle une plus grande probabilité pour qu'il soit possible de trouver une dose de castration constante lors d'application intrautérine, plutôt que lors d'application vaginale. En

partant de ce point de vue, et jusqu'à ce que la dose de castration de radium ait été aussi exactement calculée que possible, il me semble préférable de continuer actuellement avec l'application intrautérine. — Comme nous l'avons fait ressortir plus haut, nos matériaux ne nous permettent pas encore de comparaison entre le traitement par le radium et celui par les rayons X, lors d'hémorragie de l'utérus. En passant, j'aurai pourtant à formuler une observation motivée surtout par l'idée préconçue, provenant souvent de personnes ignorant tout de la radium-thérapie, que le traitement par les rayons X est dans ces cas le seul correct, par suite du dosage exact qu'autorise les rayons X. La possibilité d'atteindre au moyen du radium une «dose de castration» aussi précise ne peut être niée uniquement pour des raisons théoriques, aussi longtemps que la question concernant l'importance de l'action directe de l'irradiation par le radium sur la muqueuse n'est pas résolue et avant de savoir quelle influence la distance variable entre les ovaires et la source d'irradiation a, comparativement avec la sensibilité individuelle différente des ovaires. La «dose de castration» du radium ne peut jusqu'ici être tentée qu'empiriquement et avant qu'un tel essai n'ait été fait avec un matériel étendu, la question, rayons X ou radium, ne me paraît, à cet égard, pas encore mûre pour une solution. La radium-thérapie au point de vue technique est si simple et en général offre des désagréments si minimes pour la malade, qu'elle me paraît en état de soutenir une comparaison avec tout au moins la castration par les rayons X, dans une à 2 séances.

Qu'on choisisse l'une ou l'autre de ces méthodes, il est absolument certain qu'aujourd'hui nous pouvons en toute sécurité assurer à la malade qui vient nous consulter pour des hémorragies climatiques, une guérison permanente. — — — Les troubles de la ménopause dans la majorité des cas de ménopause artificielle chez des femmes dans la période climatique, n'ont pas été plus graves que dans les ménopauses physiologiques et en tous cas la plupart de nos malades se sont félicitées du traitement.

### Résumé

De 1916 à 1921. on a traité, à l'Institut de Radium à Stockholm (Suède) 49 cas non compliqués d'hémorragies climatiques; ces cas furent suivis ultérieurement. Tous furent traités au Radium. Un seul traitement dans 41 cas dont 30 intrautérins et 11 vaginaux, dans 7 cas, 2 traitements et dans 1 cas, 3 traitements.

Résultat: aménorrhée dans 32 cas, oligoménorrhée dans 16 cas. Un cas d'insuccès.



## Zur Frage der Intensitätsverteilung der $\gamma$ -Strahlen radioaktiver Substanzen innerhalb eines absor- bierenden Mediums

von

*Otto A. Glasser, Frankfurt a. M.*

Eine Bereicherung der theoretischen und experimentellen Untersuchungen auf dem Gebiete der Intensitätsverteilung der primären  $\gamma$ -Strahlen radioaktiver Substanzen bringt eine kürzlich in dieser Zeitschrift veröffentlichte Arbeit von ROLF M. SIEVERT.<sup>1</sup> Die auf diesem Spezialgebiet erzielten Resultate sind gleich wichtig für den Mediziner wie für den Physiker. Dem Arzt müssen endlich exacte Handhaben zu einer einwandfreien Dosierung bei Verwendung radioaktiver Substanzen zu Therapiezwecken gegeben werden, — die dazu notwendigen Untersuchungen stellen den Physiker vor interessante Fachaufgaben: Intensitätsverteilung, Absorption, Streuung etc. Gerade die Lösung dieser Aufgaben ist schwierig und eine ganze Reihe von verschiedenen Lösungen bei gleichgestellten Problemen sind bei experimentellen Bestimmungen dadurch entstanden, dass wichtige Faktoren unberücksichtigt blieben oder nicht berücksichtigt werden konnten (z. B. Einfluss der Streustrahlung und Sekundärstrahlung des Filters, Streustrahlung des absorbierenden Mediums etc.)

Es ist daher um so notwendiger, dass etwaige Differenzen der Resultate der unter ähnlichen Versuchsbedingungen angestellten Untersuchungen einer Kritik unterzogen werden. Aus dem Grunde soll auf einige Einzelheiten der oben erwähnten Arbeit von SIEVERT eingegangen werden, die nicht ganz in Einklang zu bringen sind mit den erstmalig vor drei Jahren veröffentlichten Resultaten des Verfassers. In einer ausführlichen Arbeit<sup>2</sup>, die der damaligen widrigen Zeitverhältnisse wegen nicht in ihrem ganzen Umfang publiziert werden konnte, wurden schon einige der von Sievert

<sup>1</sup> ROLF M. SIEVERT, "Die Intensitätsverteilung der primären  $\gamma$ -Strahlung in der Nähe medizinischer Radiumpräparate" Acta Radiologica; Stockholm 1921, Vol. I. Fasc. 1. Nr 1.

<sup>2</sup> OTTO A. GLASSER, "Intensitätsverteilung der  $\gamma$ -Strahlen radioaktiver Substanzen innerhalb eines absorbierenden Mediums" Diss. Freiburg i Br. 1919.

veröffentlichten theoretischen Berechnungen der Intensitätsverteilung der  $\gamma$ -Strahlen unter verschiedenen Bedingungen (Form der Strahlenquelle, Anordnung des absorbierenden Mediums etc.) ausgeführt, so wie sie für den praktischen Gebrauch des Arztes notwendig erschienen. In dem Zusammenhang wurde auch auf die divergierenden Resultate hingewiesen, welche die verschiedenen Forscher bei der Bestimmung des Abschwächungskoeffizienten gefunden hatten; die verschiedenen Messmethoden und deren Einfluss auf die Bestimmung der Grösse des Abschwächungskoeffizienten wurden einer eingehenden Besprechung unterzogen. Das Resultat dieser kritischen Betrachtung führte für physikalisch möglichst einwandfreie Intensitätsberechnungen zu denselben Werten, die jetzt auch SIEVERT in seinen Berechnungen verwertet.

Ganz unabhängig davon sind die »berechneten Dosen« in der Gegenüberstellung zu den »gemessenen Dosen« zu verstehen, so wie sie in Auszügen<sup>1,2,3</sup> aus dem zweiten Teil der oben erwähnten Arbeit<sup>4</sup> veröffentlicht wurden.

Diese theoretischen Dosenwerte (die betreffende Tabelle, welche die relative Abnahme der Dosis mit der Entfernung von der Mitte des Radiumpräparates zeigt, sei noch einmal hier angefügt) sind aus Abstands- & exponentiellem Absorptionsgesetz errechnet, absichtlich unter Annahme einer punktförmigen Strahlenquelle und dem unwahrscheinlichen Mittelwert  $\mu = 0.11$  des  $\gamma$ -Strahlen Abschwächungskoeffizienten für Wasser.

Tabelle

| Abstand in cm<br>von der Mitte<br>des Strahlers | Gemessene<br>Dosis | Berechnete<br>Dosis | Unterschied<br>in % der be-<br>rechneten<br>Dosis |
|---|--------------------|---------------------|---|
| 1   | 108.0              | 90.0                | 20.0  |
| 2   | 25.0               | 20.26               | 23.4  |
| 3   | 11.2               | 8.1                 | 38.2  |
| 4   | 5.8                | 4.1                 | 41.5  |
| 5   | 3.6                | 2.36                | 52.5  |
| 6   | 2.4                | 1.48                | 62.1  |
| 8   | 1.3                | 0.65                | 100.0   |
| 10  | 0.8                | 0.35                | 130.0   |

Die spezielle Wahl dieser Bedingungen und die Gegenüberstellung der daraus berechneten Dosen mit den experimentell für ein ausgedehntes

<sup>1</sup> W. FRIEDRICH & O. GLASSER, "Ueber die Dosenverhältnisse bei inkorporaler Radium- & Mesothoriumtherapie" Strahlentherapie 11. S. 20 1920.

<sup>2</sup> E. OPITZ & W. FRIEDRICH, "Die Freiburger Strahlenbehandlung des Uteruskrebses" M. med. Wschr. 1920, I. S. 1.

<sup>3</sup> E. OPITZ, "Die neuzeitliche Tiefentherapie in der Gynäkologie" Therapie der Gegenwart, Jan./Febr. 1920.

<sup>4</sup> (Siehe Fussnote Seite 1.)

Präparat exact gemessenen Dosen geschah nur um auf die Fehler bei der damaligen Dosenbestimmung durch Rechnung zur therapeutischen Verwendung hinzuweisen; es wurde zu jener Zeit meist bei der Berechnung der Dosenverteilung im Gewebe der Wert  $\mu = 0.11$  für den Abschwächungskoeffizienten benutzt<sup>1</sup> und die Ausdehnung des Präparates gar nicht beachtet.

Nur aus diesem Grunde schien es nicht nur wünschenswert, sondern auch geboten gerade diese — in der Praxis benützten — berechneten Dosenwerte den gemessenen gegenüber zu stellen. Selbstverständlich werden die Unterschiede zwischen berechneten und gemessenen Dosenwerten erheblich kleiner, wenn man bei der Berechnung die Strahlenausdehnung berücksichtigt und den exactest bestimmten Abschwächungskoeffizienten für die  $\gamma$ -Strahlung im Gewebe verwendet (etwa  $\mu = 0.08$  als Mittel aus den Kohlrausch'schen Werten  $\mu_{k_1}$ ,  $\mu_{k_2}$ ,  $\mu_{k_3}$  für die drei wichtigsten  $\gamma$ -Strahlenkomponenten des Radium C).

Die von SIEVERT angeführte Differenz zwischen seinen und den von Friedrich und Glasser angegebenen berechneten Werten besteht also nur insofern als Sievert seine Werte vergleicht mit den unter anderer Voraussetzung zu einem bestimmten Zweck errechneten Werten. Auf den Unterschied der unter diesen speziellen Voraussetzungen (so wie sie die medizinische Literatur 1919 angab) errechneten und den unter Beobachtung exacter physikalischer Daten erzielten Dosenwerten wurde schon in der oben erwähnten Arbeit<sup>2</sup> hingewiesen und auch im Anschluss daran erklärt, dass erst der Unterschied zwischen den exact berechneten Werten und den experimentell gefundenen auf die im absorbierenden Medium entstehende Streustrahlung zurückzuführen ist.

Der von Sievert beobachtete weit kleinere Anteil dieser Streustrahlung am Zustandekommen der Gesamtdosis im Gegensatz zu dem vom Verfasser beobachteten ist auf den Unterschied in den beiden Versuchsapparaturen zurückzuführen, d. h. hauptsächlich wohl auf die ungeeignete Art der Anordnung der Sievert'schen Ionisationskammer innerhalb des streuenden Mediums. Gerade über die Wichtigkeit der richtigen Anordnung wird eine in kurzer Zeit erscheinende Abhandlung Aufschluss geben, in welcher die Messresultate von mehreren Jahren veröffentlicht werden. Mit einer verbesserten Methode wurden an der vom Verfasser beschriebenen Apparatur die schon erzielten Resultate nachgeprüft und bestätigt (insbesondere auch wieder annähernd die gleiche Streuzusatzdosis gemessen) und die Intensitätsverteilung bei einer Reihe von neuen Strahlerkombinationen experimentell bestimmt. Für diese Kombinationen wurden ebenfalls die Flächen gleicher Intensität (Isodosen) gemessen.

<sup>1</sup> s. Z. B. bei E. KEHRER, "Die wissenschaftlichen Grundlagen und Richtlinien der Radiumbehandlung des Uteruskarzinoms" Archiv f. Gynäkologie, 108. Heft 2 u. 3.

<sup>2</sup> (Siehe Fussnote Seite 1.)

Auch hier zeigt sich wieder die schon seit Jahren bekannte Form der Isodosen mit ihren typischen Einbuchtungen an den Enden. Sievert misst in seiner Arbeit dieser Isodosenform wohl zu wenig Bedeutung bei, zufolge einer Betrachtung der Absorptionsverhältnisse des Radiumsalzes und des Filters, etc. Gewöhnlich wird der Fall so liegen, dass der Absorptionskoeffizient des Radiumsalzes grösser ist als der des Filters und dass die Filterwand sehr dünn ist. Solange diese Faktoren in ihrer Grösse nicht genügend bekannt sind, werden genaue Resultate einer theoretischen Ueberlegung nicht zu erwarten sein und auf jeden Fall ist die experimentelle Bestimmung der Isodosenform der theoretischen Rechnung vorzuziehen. Bei den verschiedensten Radiumpräparaten, die mit der Ionisationsmethode auf ihre Flächen gleicher Intensität untersucht wurden, fanden sich die starken Einbuchtungen. Es gelang auch diese charakteristische Form direkt bildlich zu gewinnen durch ein kombiniertes photographisches Verfahren (mit Röntgen- & Radiumstrahlen). Ein solches Isodosenbild wurde schon mehrfach in Abhandlungen gezeigt<sup>1</sup>. Ein neues Verfahren, welches ebenfalls gestattet die Isodosenform auch räumlich in ihrer wahren Ausdehnung festzulegen, wird demnächst in einer physikalischen Zeitschrift publiziert. Alle diese Versuche führen auf den verschiedensten Wegen zu derselben typischen Form von Flächen gleicher Intensität um das Radiumpräparat herum. Wie wichtig für den Arzt die Berücksichtigung dieser Verhältnisse ist, geht aus einer kurzen Betrachtung hervor. Bei einem normalen Radiumpräparat (45 mg Ra El, 22 mm Länge, 5 mm Durchmesser, in dünner Silberhülse + 1.5 mm Messingfilter) bekommt z. B. ein kleines Volumelement das an den Enden des Präparates dem Filter anliegt in einer bestimmten Zeit dieselbe Dosis wie in gleicher Zeit das gleiche Volumelement, das etwa 1 1/2 cm von der Mitte des Präparates entfernt liegt (auf einer senkrecht zur Präparatenachse durch die Mitte gelegten Scheibe). Zu bemerken ist dabei noch, dass alle die erwähnten Versuche mit Radiumpräparaten ausgeführt wurden, die gleichmässig mit radioaktiver Masse gefüllt waren und deren Filterwandstärke überall die gleiche war.

Zum Schluss sei noch ein Wort gesagt zur Benennung der Flächen gleicher Intensität. Nach ihrer ersten Festlegung wurde für sie aus rein praktischen Gründen der Name Isodosen gewählt, trotzdem dabei in einschränkender Voraussetzung die Zeit als konstant angesehen werden musste. Andere Forscher gaben dann diesen Flächen die ungeeignete Bezeichnung Isodynamen.<sup>2</sup> Sievert gibt nun in seiner Abhandlung den Flächen den

<sup>1</sup> (Siehe Fussnoten Seite 475 u. 476.)

<sup>2</sup> W. LAHM "Vorschläge zur Vereinheitlichung der Dosenangabe in der Radiumtherapie" Fortschritte a. d. G. d. Röntgenstr. 27. S. 442. 1920.

— W. LAHM, Radiumtiefentherapie, Steinkopff, Leipzig 1921.

mathematischen terminus technicus Aequiintensitätsflächen. Es sind also schon wieder drei Bezeichnungen für ein und dieselbe Sache vorhanden, und es ist an der Zeit, dass man sich, um einer noch grösseren Verwirrung vorzubeugen, auf einen Fachausdruck einigt, vielleicht auf den von SIEVERT eingeführten etwas umständlichen, aber mathematisch und physikalisch einwandfreiesten.

Es ist dringend notwendig, dass auch auf dem Gebiete der exacten Radiumdosimetrie immer weiter vorwärts geschritten wird. Einen bescheidenen Beitrag zur Lösung der wichtigen Probleme sollen diese Zeilen bringen.

### Zusammenfassung

Es wird die Ursache der Unterschiede zwischen gemessenen und berechneten Dosenwerten verschiedener Forscher klargelegt. Betont wird das Vorhandensein einer beträchtlichen Streuzusatzdosis im absorbierenden Medium bei der harten  $\gamma$ -Strahlung und die Wichtigkeit diese mit einwandfreier Messmethode nachzuweisen. Die eigenartige Form der Flächen gleicher Intensität (Isodosen) wird in Ihrer Bedeutung für die praktische Verwendung noch einmal erwähnt und der Vorschlag gemacht diese Flächen einheitlich zu bezeichnen.



## Über Vorrichtungen zur Abblendung der Sekundärstrahlung bei der Röntgendiagnostik

von

Dr Åke Åkerlund

Gegen Ende des Jahres 1912 publizierte BUCKY (1), in Berlin, einen kleinen Aufsatz über eine neue Abblendungsmethode bei *Durchleuchtungen*, welche die Bildqualität durch Vermeidung der im untersuchten Körperteil entstehenden Sekundärstrahlung verbessern sollte, und auf dem Röntgenkongress in Berlin 1913 entwickelte er diese Methode näher (2), und berührte auch ihre Anwendung bei der *Röntgenphotographie*.

Um die Sekundärstrahlung des Körpers möglichst auszuschalten, verwendete BUCKY anfangs eine *Zylinderblende* zwischen Objekt und Durchleuchtungsschirm. — Diese Zylinderblende wurde bald durch eine »*Gitterblende*« aus 2—3 cm breiten, auf die Kante gestellten Metallbändern ersetzt, die zu einem quadratischen Netz angeordnet und so eingestellt waren, dass die verschiedenen Bandflächen auf einen und denselben Punkt konvergierten. Dieser Konvergenzpunkt sollte der Lage des Fokus der Röntgenröhre entsprechen, wodurch jedes einzelne Metallband den möglichst kleinsten Schatten werfen würde. Infolge dieser Anordnung markierten sich die Schatten der Bleibänder bei richtiger Einstellung des Röhrenfokus nicht als breite Streifen, sondern nur als feine Linien. BUCKY teilte bei dieser Gelegenheit mit, dass er sich ausserdem mit Versuchen beschäftigte, um das Hervortreten des Liniennetzes auf der Platte vollständig zu vermeiden. Ein Resultat dieser späteren Untersuchungen hat indes BUCKY, soweit ich finden konnte, danach in der Röntgenlitteratur nicht mitgeteilt.

Einige Jahre später kam dagegen LOTZIN (3) in Allenstein mit einer Lösung dieses Problems. LOTZINS Vorrichtung bestand in folgendem. Parallele Metallbänder von 1 cm Breite und 0.05 mm Dicke waren im gegenseitigen Abstand von 1 mm so in zwei Stahlrahmen aufgespannt, dass die Bänder gleichzeitig gegen einen Punkt von 75 resp. 76 cm Abstand (Röhrenfokus) konvergierten. Die zwei Stahlrahmen waren mit-

einander derart zusammengefügt, dass die beiden Metallbandsysteme zusammen ein quadratisches Netz bildeten, welches während der Exposition mittels eines elektrischen Motors in eine oszillierende Bewegung mit kleinen Exkursionen versetzt wurde, in einer Richtung, die von der einen Diagonale des Quadratnetzes unbedeutend abwich. Bei jeder Änderung der Bewegungsrichtung wurde der Röhrenstrom für einen Augenblick automatisch ausgeschaltet.

Nach LOTZIN gelang es mit dieser Anordnung, die Schattenbilder des Bleigitters nahezu zu unterdrücken und die Bilder waren auffallend klar und schleierfrei. — Es ist mir nicht bekannt, ob eine fabrikmässige Ausführung des Apparates zustandegekommen ist. Nach den Abbildungen zu urteilen, scheint der Apparat, der auf einem stabilen, verstellbaren Stativ fixiert sein soll, ziemlich plump und unbequem zu sein, und ausserdem muss die Bildschärfe unter dem relativ grossen Abstand zwischen Objekt und Platte leiden.

Wer mehr als alle anderen dazu beigetragen hat, das Prinzip BUCKYS für die *Radiographie* praktisch anwendbar zu machen, ist HOLLIS POTTER in Chicago. POTTERS (4) erste Arbeit (März 1916) hatte eigentlich das Ziel, jenen Teil der Sekundärstrahlung, der von anderen Partien der Röntgenröhre als dem Fokus selbst ausgeht, die »Glasstrahlen«, zu eliminieren. Dies wurde durch ein wabenähnliches, bogenförmig gewölbtes Diaphragma erreicht, das zwischen der Röntgenröhre und dem Patienten angebracht war und während der Exponierung in eine langsam fortschreitende Bewegung versetzt wurde, in einer gekrümmten Fläche deren Mittelpunkt dem Röhrenfokus entsprach. Ein Diaphragma der gleichen Konstruktion konnte nach POTTERS erster Mitteilung auch zwischen dem Patienten und der Platte angebracht werden, um die Sekundärstrahlung zu eliminieren, die von dem Patienten ausgeht, die »Objektstrahlen«.

Im darauffolgenden Jahr (Februar 1917) gab POTTER (5) eine einfache Vorrichtung an, um bei *Durchleuchtung* mit BUCKY-Diaphragma das störende Netzbild zu vermeiden. Das Diaphragma, das er dabei anwendete, hatte die Form einer runden Scheibe von ca. 40 cm Durchmesser und wurde durch einen elektrischen Motor in rotierender Bewegung gehalten. Die Bleibänder waren an den peripheren Teilen der Scheibe nahezu radial angeordnet; der zentrale Teil der Scheibe war kompakt und kam bei der Durchleuchtung nicht zur Verwendung. Das Durchleuchtungsbild wurde auf einem kleinen kreisrunden Schirm von 10–15 cm Durchmesser aufgefangen, der über den oberen Teil der rotierenden Scheibe angebracht wurde. Der Nachteil dieses Apparates war, dass die rotierende Scheibe im Verhältnis zu der verwendbaren Bildfläche ungemein gross und plump war.

Nach fortgesetzten Experimenten veröffentlichte POTTER (6) im Juni



1920 eine neue Publikation. Da es sich gezeigt hatte, dass keine lineare zirkulare oder unregelmässige Bewegung eines Quadratnetzes von der Konstruktion BUCKYS ein vollständiges Verschwinden des Netzbildes bewirken konnte, hatte POTTER von einem derartigen Gitterdiaphragma Abstand genommen und war statt dessen zu einem etwas weniger wirk-samen Diaphragma übergegangen, das nur aus parallelen, kantengestellten und gegen den Fokus konvergierenden Metallbändern bestand, die während der Exponierung in einer gegen die Metallbänder senkrechten Richtung verschoben wurden.

POTTER für seinen Teil empfahl gerade Bänder aus Typenmetall,  $1\frac{1}{2}$  cm breit,  $\frac{1}{2}$  mm dick, durch dünne Holzleistchen von 4 mm Dicke geschieden. Diese kantengestellten Blei- und Holzleisten waren in einem Stahlrahmen zu einer Art gekrümmten Schirms zusammengefügt, der einen Abschnitt einer Zylinderfläche von 60—65 cm Radius darstellte. Während der Exposition wurde der Schirm in eine langsam fortschreitende Bewegung um die Achse des Zylinders versetzt, in welchem der Röhrenfokus gelegen war. Unmittelbar oberhalb des beweglichen Schirms befand sich eine gebogene Platte mit der gleichen Krümmung wie der Schirm, aus Aluminium oder dünnem Holz hergestellt, auf welche der Patient gelegt wurde; unterhalb des Schirms befand sich ein Zwischenraum, in den die Kassetten eingeschoben wurden. Infolge der Krümmung des Schirmes konnten die planen Kassetten nur in der Mittellinie dem Schirm dicht anliegen, oberhalb dessen der Patient gelagert war; an den Seitenpartien entstand zwischen den Platten und dem Patienten ein gegen die Peripherie zunehmender Abstand, ein Verhalten, das ja natürlich einen recht grossen Nachteil für die Bildschärfe bedingen musste.

POTTERS Erfindung brachte indes eine gewaltige Verbesserung der Qualität der Röntgenogramme von dickeren Körperteilen mit sich, besonders beim Rumpf und Becken. Sowohl die Knochenstruktur als die Weichteilseinzelnheiten traten auch an grossen Übersichtsbildern mit einer bis dahin ungeahnten Klarheit hervor. Die Expositionszeit war etwas verlängert, aber das konnte teilweise dadurch kompensiert werden, dass eine bedeutend grössere Härte der Röhre und eine grössere Belastung als gewöhnlich angewendet werden konnte, ohne dass die Bildqualität darunter litt.

POTTERS Publikation weckte grosses Aufsehen, besonders in Amerika, wo die Erfindung als der grösste Fortschritt der röntgenologischen Technik seit der gasfreien Röhre bezeichnet wurde.

Mehrere amerikanische Firmen haben bereits einige miteinander nahezu identische Typen von »BUCKY—POTTER Diaphragmen» auf den Markt gebracht, z. B. VICTOR X-Ray Corporation, BRADY, ENGELN und VIOLI.

Seit ich mit POTTERS Diaphragma zu arbeiten begonnen, hat das Problem, beim Röntgenphotographieren die sekundäre Objektstrahlung zu unterdrücken, immer mehr mein Interesse gefesselt. Trotz aller ihrer guten Eigenschaften scheint mir die Lösung POTTERS doch mit gewissen Schwächen behaftet. Einerseits lässt POTTERS Diaphragma alle jene Sekundärstrahlen unberührt, die in der Ebene der parallelen Bleibänder verlaufen, andererseits ist der Abstand zwischen grossen Teilen der Platte und dem Objekte sehr gross, was natürlich auf die Bildschärfe einwirkt, auch ist der ganze Apparat gross und schwer, kann nur mit Schwierigkeiten für Untersuchungen in aufrechter Körperstellung aptiert werden und muss womöglich auf einem besonderen Untersuchungstisch angebracht sein, wenn er wirklich bequem brauchbar sein soll.

Ich habe mich deshalb in der letzten Zeit damit beschäftigt, ein neues Modell der BUCKY-Blende auszuarbeiten und Ingenieur Järnh in Stockholm hat bereits einige Versuchsmodelle nach meinen Angaben ausgeführt, die so schöne Resultate, sowohl hinsichtlich der Bildqualität wie auch der Unsichtbarkeit der Schatten des Metallbandsystems, gezeigt haben, dass ich glaube, jetzt eine vorläufige Mitteilung über diese Experimente machen zu können.

Ich ging davon aus, dass eine flache kreisrunde Scheibe, die um ihren eigenen Mittelpunkt rotiert, die wenigst platzraubende und bequemste Form einer Sekundärblende sein müsste, die zwischen Patient und Platte angebracht werden können soll, ohne den Abstand zwischen denselben nennenswert zu vergrössern und die während der Exposition in eine gleichmässige Bewegung versetzt werden können soll. Nach einigen vorbereitenden Modellen bestimmte ich mich sehr bald dafür, die Blende als Spirale zu konstruieren, d. h. derart, dass sich das Bleiband in einer Spirale aufwindet, die vom Zentrum der Blende gegen die Peripherie geht. Sieht man die Bleibandspirale auf einem Querschnitt, so steht das Band im Zentrum senkrecht gegen die Blendenfläche; je weiter peripheriewärts man aber kommt, desto mehr neigt es sich allmählich gegen diese Fläche, so dass das Band die ganze Zeit nur den oberen Rand — aber keinen Teil der Seitenflächen — gegen den Fokus wendet. Zu beachten ist, dass die Spirale besonders gut im Bewegungszentrum der Scheibe zentriert sein muss, wenn eine Ringbildung auf den Platten vermieden werden können soll.

Modelle mit einem anderen Bau der rotierenden Blende, als dem spiralförmigen ergaben störende Ringbildungen, ob man nun ein Quadratnetz anwendet oder ein einfaches paralleles Gitter, oder eine sternförmig oder radiär angeordnete Blende, bei der die verschiedenen Radien, um einen grossen zentralen Schatten zu vermeiden, in ungleichem Abstand vom Zentrum endeten. *Alle Kreuzungen zwischen den Bleibändern oder*

jäher Abbruch derselben muss vermieden werden, wenn das Bildfeld vollständig gleichmässig beleuchtet werden soll.

Wenn eine derartige Spiralblende wirkungsvoll sein soll, müssen die einzelnen Spiralbänder ziemlich dicht stehen. Ich versuchte es zuerst mit einer einfachen, dünnen Bleibandspirale, die mit Einlage eines  $1\frac{1}{2}$  bis 2 mm dicken Tuchstreifens aufgewunden war. Es erwies sich jedoch als unmöglich, beim Aufwickeln einer so dichten Spirale die ganze Zeit die ideale Spiralform im Verhältnis zum Bewegungszentrum beizubehalten, und auch die notwendige, gegen die Peripherie zunehmende Neigung zu beachten, weshalb dieses Modell eine starke Ringbildung bewirkte.

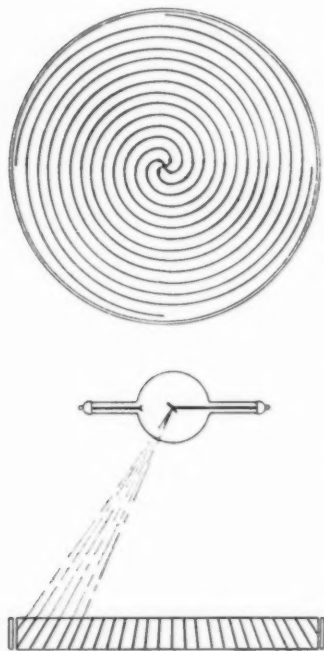


Fig. 1.

Um diese Schwierigkeiten zu vermeiden, kam ich auf die Idee, (Fig. 1.) an Stelle einer Spirale mehrere, z. B. vier Spiralen zu verwenden, alle mit Ausgangspunkt und genauer Zentrierung im Bewegungszentrum. Dadurch konnte jede Spirale eine grössere Steigung erhalten, ohne dass der Abstand zwischen zwei benachbarten Spiralwindungen vermehrt und damit die Leistungsfähigkeit vermindert zu werden brauchte. Ein nach diesen Prinzipien gebauter Schirm konnte — und das war ein mindestens ebensogrosser Vorteil — auch zum grossen oder wesentlichen Teil fabrikmässig mit der Maschine hergestellt werden. Ein

Bericht über die Arbeitsmethoden und Fabrikationsprinzipien, die in Zusammenarbeit mit Ingenieur Järnh und seinen Assistenten ausgearbeitet wurden, fällt ausserhalb des Rahmens dieser Mitteilung. Diesen Typus der rotierenden Spiralblende habe ich zum Patent angemeldet.

Bei Untersuchung der einschlägigen ausländischen Patentrechte zeigte es sich, dass das Prinzip der rotierenden Blendenscheibe mit spiralförmigem Bleiband nicht neu war. WERNER OTTO in Berlin hatte zwei solche Patente vom 20. Jan. 1914 und EUGENE CALDWELL in New York ein solches vom 12. Dez. 1916. Beide Patente haben indes — soviel ich weiss — nicht zu einem im Handel erhältlichen Fabrikat geführt und sind auch in der medizinischen Röntgenliteratur nicht erwähnt. Der Grund dafür scheint mir zu sein, dass alle diese Vorschläge in

wichtigen Punkten prinzipiell unrichtig sind, wodurch eine gleichmässige Bildfläche, die gerade das Ziel der Erfindung ist, ausgeschlossen scheint.

OTTO wendet bei seinen beiden Vorschlägen eine für sich allein wenig wirkungsvolle Spirale mit steiler Steigung an. Um den Effekt dieser Spirale zu verstärken, führt er in seinem ersten Vorschlag eine Menge verschieden langer, in radialer Richtung verlaufender Zwischenwände zwischen den benachbarten Spiralwindungen ein, in dem anderen Vorschlag kombiniert er die Spiralblende mit einer selbstständigen, sternförmigen Blende, deren verschiedene Strahlen in ungleichem Abstand vom Rotationszentrum enden. In beiden Fällen nützt also OTTO das Spiralprinzip nicht aus, sondern kombiniert die Spiralblende behufs einer grösseren Wirkung mit einer anderen Blendentype, was Ringbildung verursachen muss.

CALDWELL hat die Anwendung mehrerer Spiralbänder mit hoher Steigung vorgeschlagen, aber einerseits sind diese Spiralen nicht im Bewegungszentrum zentriert sondern im Gegenteil in einem gewissen Abstand von demselben, und andererseits sind die Spiralen nicht parallel nebeneinander angeordnet, sondern sie schneiden einander in vielen Punkten. Jeder dieser beiden Umstände führt wie erwähnt, Ringbildung herbei.

Es ist also evident, dass es bisher nicht geglückt war, eine gute Spiralblende zu konstruieren, wenn auch das Spiralprinzip schon viele Jahre alt ist. Es ist meine Überzeugung, dass eine nach den oben von mir angegebenen Prinzipien gebaute Blende sowohl wirkungsvoller, als auch leichter zu handhaben gemacht werden kann, als die POTTER-Blende: wirkungsvoller weil der Abstand zwischen Objekt und Platte weiter vermindert ist und weil die blosse Krümmung der Spiralbänder eine stärkere Abblendung der sich in geraden Bahnen fortpflanzenden Sekundärstrahlen mit sich bringt, leichter zu handhaben deshalb, weil sie viel weniger platzraubend und leichter als das POTTER-Diaphragma ist und weil sie sich ohne Schwierigkeit verschiedenen Körperlagen anpassen lässt.

### Zusammenfassung

Nach einem Bericht über die verschiedenen von BUCKY, LOTZIN und POTTER angegebenen Vorrichtungen zur Abblendung der Sekundärstrahlung bei der Röntgendiagnostik beschreibt Verf. ein von ihm angegebenes neues Modell einer beweglichen Sekundärblende, welche äusserst vielversprechende Resultate gegeben hat. Diese Blende hat die Form einer rotierenden, flachen, kreisrunden Scheibe, auf welcher eine Anzahl dicht-

stehender, miteinander paralleler und genau im Bewegungszentrum zentrierter, spiralförmiger Bleibänder angebracht ist, die gleichzeitig in der Ebene der Primärstrahlung eingestellt sind, so dass sie gegen den Röhrenfokus konvergieren.

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PROCEEDINGS  
OF THE  
NORDISK FÖRENING  
FÖR MEDICINSK RADIOLOGI

AN ACCOUNT OF THE SECOND SCIENTIFIC  
MEETING OF THE SOCIETY

SEPTEMBER 24, 25, 1921  
AT COPENHAGEN

EDITED BY  
*TEODOR LARSÉN, M. L. STOCKHOLM*  
SECRETARY

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## The first meeting

### I. Sigfrid Ström, Umeå: On the Roentgen Diagnostics of Changes in the Appendix and Cæcum

Published in Acta Radiologica. Vol. I. fasc. 2, p. 133.

#### Discussion:

1. GÖSTA FORSSELL, Stockholm: I am of Dr STRÖM's opinion as regards the importance of verifying, by means of *opaque enemas*, whether the caecum is normally mobile. A caecum that, after a *contrast meal*, is lying in the pelvis, is often unable to be palpated manually, whereas with a contrasting enema a free caecum will rise as a rule from the pelvis and become accessible to palpation. I would also draw attention to the *spasmodic* phenomena that STRÖM observed in the appendix in chronic inflammatory changes. Together with the finer development of the technique, these spasmodic phenomena should play an important part in the diagnostics of changes in the appendix. But in two points I cannot entirely agree with Dr Ström's conclusions.

When he states that »a normal appendix can be proved at the roentgen examination just as well as a pathological one», I do not find that this tallies exactly with his own observations. In the operative material of 12 patients under his observation, fecal contents in the appendix *were absent* in 12 cases, or 29 %, and of these 12 cases only 4 did not show pathological changes. The remaining 8 cases all had changes, explaining the aggravated filling of the appendix. This seems to me to indicate, with some probability, that *a deficient filling is often due to changes in the appendix*. The original assumption, expressed by GRIGORIEFF, that the appendix could always be seen at the roentgen examination, unless on account of anatomical conditions its lumen was shut off, is, probably, with reliable technique, very close to the true fact. That the appendix was only observed in  $\frac{1}{2}$  to  $\frac{1}{3}$  of clinically normal cases may be so explained, that obliteration and kinks of the appendix often occur without assignable symptoms.

When Dr. STRÖM asserts that »retention in the appendix after the emptying of the caecum should only with extreme caution be interpreted as a pathological symptom», I can only agree with him. But when he says that a normal appendix empties, as a rule, 1—2 days after the caecum, I cannot agree with him. My experience is that the appendix empties, as a rule, at the same time as the caecum, or within 24 hrs. after it.

In four cases where the roentgen diagnosis had been made principally on the basis of the *tenderness* on pressure over the appendix and considerable delay in the emptying of the same, no *macroscopical* changes have been found in the ap-

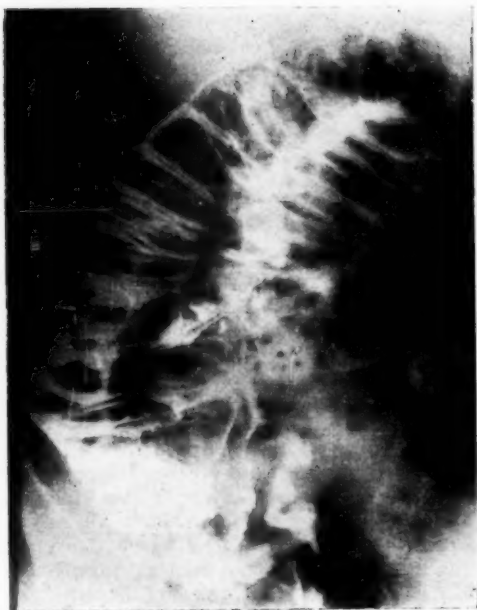


Fig. 1.

and to which CASE also inclines, has, in my opinion, led the roentgen diagnostics of the appendix into a false track, and discredited them in certain directions. I am entirely of Professor FORSSELL's opinion, that it is often pathological changes in the appendix, such as obliterations, stenoses, etc., that prevent the showing of the appendix at a roentgen examination. This also follows from what I expressed in my lecture on the reason why the appendix sometimes does not fill. In some cases, however, I did not find any reason other than that the caecum is situated in the lesser pelvis and cannot be moved from there. My examinations of corpses also point to the possibility that Gerlach's valve may sometimes play a part in the filling mechanism of the appendix, though it should not do so as a rule.

My experience of a number of operated appendices which had revealed pronounced retention at the roentgen examination (not all included in the material published here) has been that, very often in such cases, no pathological change could be pointed out in the appendix. I also consider that in a roentgen examination we ought to try to reveal the cause of the patient's symptoms of disease, and that an atrophy or cicatrices in the muscular coats of the appendix, which may be the cause of retention in it, do not give rise to any symptoms of disease at all.

Nor do I believe that the material hitherto published justifies the conclusion that an appendix with pronounced retention, 'poorly drained', as CASE calls it, is especially predisposed to appendicitis. On the other hand, most of my operated cases of chronic appendicitis have not shown any pronounced retention in the appendix, and in several of them the appendix has emptied unusually quickly.

pendix, for which reason the appendix has not been considered to have been the causative factor in the disease.

In this connection I would, however, indicate the possibility of *microscopic* changes having occurred in the appendix in the form of changes in muscularis, which could have accounted for the retarded emptying. The lecturer seems to me to have also undervalued the pathological importance of a lengthy retention of the contents in the appendix, which is, however, generally regarded as a disposing cause in appendicitis.

2. S. STRÖM, Umeå: My conclusion, that a normal appendix can be proved at a roentgen examination just as well as a pathological one, is perhaps somewhat unclearly formulated. I wished to point out that it is not to be considered as a pathological symptom that the appendix fills with an opaque meal.

This view, which is held by GROEDEL

But it is to be hoped that continued examinations will throw light on this point, and at the same time afford greater insight into the pathogeny of appendicitis.

3. S. HEYERDAHL, Christiania: With regard to valvula Bauhini, I am quite of the first speaker's opinion that an insufficiency of valv. Bauhini after an enema is not to be regarded as a pathological symptom. My experience in this matter is derived to a great extent from a stay at the Mayo Clinical Hospital, Rochester, where I had numerous opportunities of seeing this confirmed both with fluoroscopic and radiographic views of healthy individuals.

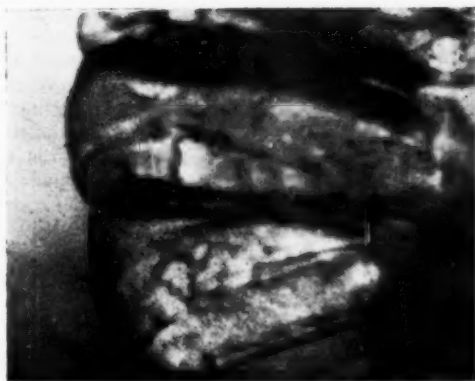


Fig. 2.

4. HUGO LAURELL, Uppsala: H. LAURELL demonstrated a Colon plate which had been taken according to a method employed by HENNING ODQUIST and himself and being further developed by them.

The caecum, ascending colon and part of the transverse colon presented a fine picture of the mucous membrane; the walls of the colon lumen, which were strongly inflated with air, being here lined with a thin coating of opaque mass which contrasted well against the air. Plicae semilunares coli and valvulae coli were sharply outlined, and that because the terminal ileum was also dilated with air; even the details of the membranous surface were seen between the plicae.

Pictures of the mucous membrane, such as that just demonstrated (see adjoining figs. 1 and 2) can be obtained in suitable cases of the cephalic parts of the colon by strong inflation of the large intestine with air a convenient number of hours after the opaque meal. An ordinary bicycle pump can be used for the purpose.

In this case the inflation took place 3 hours after the consumption of the opaque meal. Only under the condition that the inflation takes place at such a time as to ensure the opaque mass being in the proximal part of the colon, and being dried to a moderately half-liquid consistence, so that it adheres to the intestinal walls, can a coating and a picture of the mucous membrane be obtained. If the drying process has advanced too far, or if the contents of the intestine are still very liquid, then the representation of such a membranous relief picture will not be successful. In the former case the opaque mass is dried up into large and small lumps, which lie more or less free in the inflated lumen; during the inflation one can sometimes distinctly observe in these cases how the dried opaque mass breaks up into small pieces, which loosen and fall down from the walls with an audible slight patter (as in a case of spastic obstipation examined by us).

If the opaque mass is rather liquid, then, by inflation, it keeps to the caudal portions of the intestinal lumen and appears with horizontal, swelling fluid-surface, while a distinct wall-coating is lacking within the air-conducting portion of the lumen.

Through this method of examination one can thus get a certain idea of the ad-

vance of the drying process within the different parts of the large intestine during normal and morbid conditions.

In analogy with the above-related method of examination for the first parts of the colon, one can similarly seek to obtain membranous relief pictures of other parts of the colon also, and of the stomach, by introducing an opaque mass of a certain quantity and consistence and afterwards inflating these parts; or, by first inflating suitable gastro-intestinal parts and afterwards powdering, so to say, the moist walls with opaque powder, and then radiographing them:

More information is, of course, to be expected from a stereoscopic examination. The above-related examinations have been started or planned by us, but it is still too early to express any opinion as to the merits of this method respecting normal and pathological conditions in the gastro-intestinal canal.

An inflation of the colon may, of course, in certain cases entail a risk for the patient and it must then be omitted.

5. ÅKE ÅKERLUND, Stockholm: A demonstration given by the speaker of a simple little arrangement for the radiography of the appendix. The arrangement is intended to facilitate, firstly, the application of the often necessary compression at such examinations and, secondly, the use of serial radiography in this tract.

The apparatus is intended for plates of  $13 \times 18$  cm. and two pictures of  $13 \times 9$  cm. are exposed beside each other on each plate. The plate cassette is shifted manually between the exposures in a groove-shaped cassette holder of thin wood, the bottom of which, turned towards the patient, is furnished with a sheet of lead  $1\frac{1}{2}$  mm. thick with a window (fenestra) of the stated size of the picture. The cassette holder is fixed against the abdominal wall in any desired position by means of 2 self-fastening straps — — the one placed

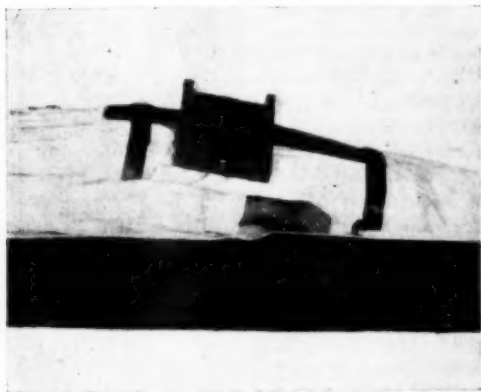


Fig. 3.

around the body, the other around the thigh with a scythe-shaped connective piece of thin wood (see fig. 3). This fixation arrangement renders a slight shift possible both in the vertical and transverse direction on insertion of the cassette holder, likewise a convenient change in the pressure of the compression. Between the cassette holder and the abdominal wall a sponge may be advantageously placed. The suitable compression and insertion of the window in the sheet of lead is controlled by means of the fluoroscope in a dorso-ventral projection. After the removal of the screen a suitable number of exposures may be made, likewise with the trochoscope.

The little apparatus is manufactured by JÄRNH & Co., Stockholm.

6. FLEMMING-MØLLER, Copenhagen: When Dr. STRÖM asserts that he cannot assign any importance to retention in the appendix, I think, like Professor FORSSELL, that he is mistaken. I consider a retention of several days points to something patho-

logical, viz. stenosis. In one case we could see the appendix filled for 17 days at a stretch, and the operation also showed stenosis at the base.

GREGORIEF's assertion, that the appendix is always affected when it cannot be seen, is certainly too strongly put, but there are indications pointing in that direction, and certainly the appendix is invisible when obliterated. In 14 of my cases, for instance, the appendix was invisible in 8. 5 of these showed an obliteration when operated on. This points somewhat in the direction that a failure to see the appendix means something pathological, and in any case we are not justified in concluding that it is sound.

I may say, with Dr. STRÖM, that examinations of the appendix can yield valuable information, but one must not expect too much from them, and one must be very precise in one's examination if anything is to be got out of it.

7. GÖSTA FORSELL, Stockholm: With reference to Dr. LAURELL's demonstration of his experiments in colouring the surface of the mucous membrane by opaque means and at the same time inflating the colon with air, I beg to mention that I have employed a method for my post-mortem examinations that has proved to be particularly well adapted to the purpose.

By injecting a solution of bromide of potassium in the lumen of the intestine, which has been hardened with formalin, I have achieved an impregnation of the whole of the intestinal wall with bromide of potassium. The fluid has then been emptied from the lumen of the intestine and air has been pumped in under slight pressure. In this way an excellent contrast can be obtained between the mucous membrane and the lumen.

It is not impossible that, by a similar method of procedure, the mucous membrane can be got to appear even in the *living* after resorption of a salt solution and following inflation of the lumen with air.

## II. J. F. Fischer, Copenhagen: On the Roentgen Treatment of Morbus Basedowii

Published in Acta Radiologica Vol. I. Fasc. 2, p. 179.

## III. S. A. Heyerdahl, Kristiania: Radium Treatment of Changes in the Thyreoid Gland.

Published in Acta Radiologica. Vol. I. Fasc. 2, p. 207.

### Discussion to lecture II and III:

1. LARS EDLING, Lund: It has been of the greatest interest to listen to Professor FISCHER's lecture on the roentgen treatment of Morbus Basedowii, based as it is on the most extensive roentgen-treated goitre material ever published, so far as I am aware. The lecture undeniably gave one a strong impression of the value of radiotherapy in the treatment of exophthalmic goitre.

The material at my disposal is, to be sure, far less extensive than the lecturer's, and my experience shorter, but, all the same, I shall permit myself to give an

account of it with the object of drawing attention to a few points which seem to me to have hitherto received too little consideration from radiological quarters.

For the survey in question I have endeavoured to collect those patients treated during the years 1915—19; previous to this I had only a few patients, of whom but incomplete notes are to be found. The cases from 1920—21, for reasons easy to understand, have not been included, the period of observation being too short for conclusions in a disease like this. The material comprises 30 cases, 27 women and 3 men, all with one exception radiated at the roentgen institute at Lund Hospital (a large number of cases being deducted, who discontinued treatment shortly after beginning it).

Of these 2 were under 20 years, 12 between 20—30 years, 8 between 30—40, 7 between 40—50 and 1 over 50 years. The treatment was begun in 1915 in 3 cases, 1916 in 9, 1917 in 5, 1918 in 9 and 1919 in 4 cases. Two-thirds of the total amount — 20 patients — have during the first part of the duration of treatment been admitted to the Medical Clinic in Lund or some other nursing-establishment and afterwards continued the radiations as out-patients; the remaining 10 originate from Prof. K. PETRÉN's private practice and have been treated solely as ambulatory cases.

As to the *clinical character*,  $\frac{5}{6} = 25$  patients have exhibited fully developed exophthalmic goitre, the other 5 may be designated as mild cases with Basedow symptoms or »formes frustes». All these are to be found later among those treated ambulatorily.

In judging the *results obtained* from the roentgen treatment there is one point of view which I wish to emphasize. In my opinion, the very centre in the clinical Basedow picture is to be sought in the morbidly changed *metabolism*, the direct manifestations of which we see in all kinds of disturbances of what we are accustomed to call »the general condition», i. e. emaciation, depression, agitation, restlessness, psychic lability, etc. The best gauge of the degree of this general *intoxication* of the organism is indisputably to be found in the state of the *bodily weight*. Next to this in clinical importance seem to me to be the vaso-motor symptoms, tachycardia, heart trouble, perspirations, diarrhoea, etc.

Accordingly, the results of the treatment should, in my opinion, be principally judged by the improvement of the patient's general condition, i. e. *the degree of the return of working capacity*. Hereby the *condition of the heart* co-operates, of course, to a material degree; whilst certain other striking symptoms, the importance of which is often emphasized, e. g. the diminution of the struma, the retrogression of the exophthalmos, the disappearance of tremors, seem to me from this viewpoint to be of more secondary importance.

Prof. FISCHER has obtained in no less than  $\frac{4}{5}$  of his cases what he calls a »positive result», in which expression he includes either a complete disappearance of all symptoms or undoubted improvement of higher or lower degree, lasting for a longer period of time.

My results do not appear to such advantage, as I have no case where I can maintain that *all* symptoms have disappeared. Consequently I have considered it more correct to avoid the term »recovered» and speak in the following only of *improvements* of various degrees. I have, however, been able to note a positive result, in this sense of the word, in 24 patients, thus  $\frac{4}{5}$  of the whole material or just up to the identical figure reached by the lecturer.

Of these cases the 9 best may be characterized as a special group distinguished by a particularly favourably influenced general condition, so that they



have felt subjectively quite well and been able to carry on their work unimpeded. Only a slight tachycardia now reminds one of the disease, with a pulse frequency in the majority of 80—90, in some even less; further, a remaining often diminished exophthalmos, in some a more or less diminished struma. There is a general increase in weight in this group not infrequently exceeding 10 kg.

Between the cases just named and the rest of the improved ones there is only a very indefinite transition. The essential differences between both categories are that, in the latter, the general condition is somewhat more labile, that they seem more easily affected by both bodily exertion and psychical emotion and that their working capacity cannot fully compare with that of the former. Four milder cases belonging to this group (*«formes frustes»*) are however, to be regarded as practically free from subjective trouble although light objective signs remain.

It should be further mentioned that, in several cases, *complications* have arisen with other diseases, e. g. *meningitis* in 1, *tuberculous glands* together with *apical tuberculosis* and *pleuritis* in 1 (both belonging to the best results), *mitral disease*, organic disease of mitral valve in 2, *myocarditis* in 1. Only in the last case can it be said that the cardiac complications exercised an obvious influence for the worse on the course of the patient's goitre.

In 2 of the cases there has been a *recurrence of a previously operated goitre*. In one case the operation (hemistrulectomy + ligature) was performed 6 years earlier, and the patient had for the last  $\frac{1}{2}$  year suffered from a pronounced although but moderately severe recurrence. She was irradiated for this for about 4 months, and has now been quite well subjectively for 3 years; has, however, palpitations now and then, and exhibits a slight persistent enlargement of the heart.

The second case is more interesting as, in my opinion, one can in all probability trace an influence on the course by radiation of the *thymus*. It was a 50 years old married woman who, after having previously received one or two extremely mild roentgen series on the thyroid gland as well as on the thymus, without any result, was operated in the autumn of 1915 in Lund for rather severe Basedow disease. After the operation an improvement set in at first, but in the spring of 1916 the general condition gradually sank again, she got tachycardia, lost flesh and became very debilitated. After 6 irradiations on the thymus gland and a couple on the struma, now with double as strong doses as on the previous occasion, the pulse frequency sank gradually to 80 or 90, and the general condition improved. She has since had good health and strength in spite of a severe psychic trauma a year or two ago.

Two *recurrences* have taken place *after roentgen treatment*, one of which was again irradiated with good result, while the other underwent a considerable change for the worse with exacerbation of nearly all symptoms, very likely due to a relative over-dosage. The patient gradually recovered after keeping her bed for a few weeks.

This short summary of my material seems to me to show that the results of the treatment on the whole do not essentially differ from those described by Prof. FISCHER. However, the objection may be urged perhaps that several of these results might have been obtained solely by internal treatment *without* the aid of roentgen rays, this so much the more as  $\frac{2}{3}$  of the patients had been the subject of clinical hospital attendance during a certain period of their illness.

I have reviewed this question more closely and have arrived at the following conception of the matter.

The 20 patients who had received *clinical hospital attendance* had been admitted to the hospital on the average for 1—2 months, seldom more, occasionally for a



still shorter period. Of these no less than  $\frac{2}{3}$  were severe or moderately severe cases with confirmed enlargement of the heart. Their medical treatment consisted of rest in bed, diet, generally Nauheim baths, as a rule bromides and valerian and phosphate of sodium per os, occasionally other internal remedies. They have been sent home partly on account of improvement, partly at the close of the first roentgen treatment, as a rule consisting of 1—2 series. A *more material* improvement has not been confirmed until a good time after discharge, for the most part 3—4 months; only in 3 cases within such a short time that one could connect it with the *hospital visit* as such. I must consider it as *probable* that since the roentgen therapy has been the main treatment after discharge we must ascribe to it the substantial portion of the result.

This seems to me still more reasonable if I compare my results with previous statements concerning the results of purely internal therapy in Morbus Basedowii. As among the cases now under consideration there are also those 6 which have *not* been improved by roentgen treatment, a percentage calculation of my clinically treated material appears as follows:

|  |   |      |
|--|---|------|
| »Quite well» or greatly improved ..... | 5 | 25 % |
| Improved, all degrees .....            | 9 | 45 % |
| Unimproved and dead .....              | 6 | 30 % |

Thus an issue of 70 % favourable, 30 % unfavourable cases.

Statistics on those cases treated internally only are extremely rare and difficult to come across. I consider, however, that I can use as comparisons those figures which SÖLLING gave at the surgical congress in Copenhagen, 1913 (quoted by BORELIUS at the General Swedish Medical Meeting in Helsingborg, 1914):

|   |    |        |
|---|----|--------|
| Quite well .....                            | 16 | 22.5 % |
| Considerably improved .....                 | 8  | 11.2 % |
| Unimproved or recurrence .....              | 29 | 40.8 % |
| Died from operation a long time after ..... | 18 | 25.5 % |

Thus altogether 71 cases with a 67 % unfavourable and 33 % favourable issue.

SÖLLING's statistics were originally compiled to show the superiority of the *surgical* goitre therapy to the internal. They seem to me no less suited to show the great advance made by *internal medicine* in the use of *roentgen light* in this disease; of course, with all reservation for the relatively short period of observation in my cases.

Finally, I will approach a chapter which Professor FISCHER has not touched upon, namely, the question of *unsuccessful* cases. In my material I have 6 such or 20 % of the total amount. All these were pronounced Basedow cases, all had a distinct enlargement of the heart, the majority might be called severe cases. Three of them were afterwards operated on, 2 with good result, 1 with but relative improvement. In one case the patient stated that she had become worse through the roentgen treatment; her condition afterwards improved spontaneously with rest, but has of late become decidedly worse again. One patient improved subjectively for a long time, whereas the objective signs were but little influenced; at last a serious change for the worse set in, after which she succumbed within a short time in spite of renewed roentgen treatment. In this case when the first roentgen treatment did not bring about the desired effect, the patient ought then, of course, to have been re-mitted for operation — — — a neglect which must be charged to my then slight experience in this particular domain. The sixth case, finally, was treated for  $1\frac{1}{2}$  years radiologically with certain intervals, without any improvement worth mentioning. At the present time she exhibits the picture of a very severe exophthalmic goitre of chronic type, but has obstinately refused operation.

In the face of such results, taking into consideration the fact that several rather pronounced goitre cases are to be found among the number of the improved, I am led to inquire why this disease shows such widely different effects from roentgen treatment, whilst in some cases it is shown to be practically refractory. Can its pathological anatomy afford us any explanation?

If one asks a pathologist about the central factor in the pathology of the Basedow syndrome, he replies by pointing out the specific change in the thyroid epithelium, the transition of the cells from the cubical fundamental type to other more swollen, juice-filled forms which deposit an immature badly staining secretion in increased quantity.

Surgery on its part sees the condition of a successful therapeutic intervention in a *diminution* of this abnormally secreting thyroid epithelium. The different value of the operative results might be explained by the morbidly changed epithelium not always occurring *uniformly distributed* in the glands, and the difficulty of guaranteeing that the intervention deals with the exact part of this parenchyma. But with roentgen treatment the matter seems to me to be otherwise. We irradiate the whole struma with its surroundings uniformly, and it seems to me practically excluded that any part hereof could escape influence. Further, it seems not very probable that the *radiosensitivity* in these morbidly changed parts should differ to any extent worth mentioning, the case concerning one and the same organ with histologically homogeneous cell modifications. Moreover, it is unlikely that the varying results are to be attributed to a supposed polyglandular character in certain cases as distinguished from others. The only gland which — hitherto at least — has been proved to stand in more intimate relationship with the thyroid gland is the thymus, which gland, I presume, is nowadays almost always included in the treatment.

Neither were the cases just related by me distinguished by a more chronic character than the rest. Only in one of them had the disease shown symptoms as far back as 2 years before the commencement of the treatment. For the rest, it concerns an anamnesis of but a few months, at most  $\frac{1}{2}$  year. Chronicity, which is considered by some authors as giving an unfavourable prognosis for radiotherapy, has thus not been enabled to play any rôle.

Can differences in the irradiation technique be taken as a ground for explanation? Possibly so, but it is not proved. As to my own technique, it has undergone a development during the period in question towards stronger doses and increased filtration, but I have not been able to establish any direct relationship between the results of irradiation and technique, as is shown by the following figures.

In the years 1915—16 I used rather small doses of 2—3 H with a filter of 3 mm. Al in series on 3—4 areas with an interval of 3 weeks. The doses were increased 1917—18 to 4—5 H with same filter in series on 3—4 areas and intervals varying from 2—4, sometimes 6 weeks. The following year the filtration was finally increased to 4 mm. Al. The dosage was unchanged but the intervals were decreased, 2 series usually being given within 2—3 weeks.

The results from the different years are as follows: During 1915—16 I had 9 cases with positive result, 3 with bad ones, whilst in 1917—18 I had 12 with good and 2 with bad results, in 1919 5 improved and 1 unimproved case. Thus no such differences exist from which conclusions concerning the influence of technique could be drawn. I may add that for the last 2 years, 1920—21, when I have used copper and zinc filters for goitre cases to a large extent, I have *not* had the impression of any further improvement in the results.

It is quite clear to me that in considering the varying susceptibility of exoph-

thalmic goitre to radiotherapy we ought to bear in mind our imperfect knowledge of the real connection between those symptoms which we have been accustomed to range under this name or, in other words, I think it right to emphasize that our conception of Morbus Basedowii as a homogeneous pathological unity is yet unproved by science. The brilliant results of operative therapy in a category of cases seem to me to have impressed too strongly our thought with respect to the importance of the thyroid tissue as the sole and conclusive etiological factor. Maybe the primitive or at any rate only cause of the Basedow's disease is not to be sought here. We must not forget that the theory of inner secretion of MÆBIUS is still only a theory and that there are, on the other hand, factors which argue in favour of the etiology of the Basedow syndrome being more complicated than this theory implies. On the one hand, we not seldom find combinations between goitre and other diseases which clearly do not stand in any organic relation with it, e. g. a vitium, a tuberculosis of the lungs. On the other hand, one meets now and again with a similar combination where one is compelled to suspect that such a connection exists or that both diseases are co-ordinated in relation to another deeper-lying cause, e. g. goitre and anæmia. Further, I would call to mind those cases in which goitre symptoms under the influence of suggestive means (which cannot very well be presumed to bring about any change in the secretion of the thyroid gland) within a short time are seen to improve or even disappear. All such phenomena confirm the opinion that it is the investigation of the *etiological* factors towards which we must principally direct our efforts in trying to master the indications for our therapeutic treatment of Basedow's disease.

2. KARL FRUMERIE (Stockholm): The fine experiences of the value of roentgen treatment with Morbus Basedowii, which Professor Fischer has brought to our notice, can also be confirmed by the results obtained by this treatment at the clinical hospitals under Professor Forssell.

I have collated the charts of patients suffering from Morbus Basedowii at the Roentgen Department of the Serafimerlasarett, and at the Radium Hospital in Stockholm.

The cases amounted to 101, but in diagnosing Morbus Basedowii I have perhaps been somewhat more rigorous than Professor Fischer, in that I have not included a great number of cases where the question was not decided whether we had to deal with a *forme fruste* of Morbus Basedowii or a simple struma with simultaneous occurrence of neurotic, especially cardiac neurotic symptoms. The patients are arranged in 3 groups: (a) those under observation from 1 month to a year; (b) from 1 to 2 years; (c) longer than 2 years.

The immediate effect of the roentgen treatment was an improvement in the general condition, and with this an alleviation of the subjective nervous symptoms and the restlessness and palpitation of the heart, to which were gradually added a decrease of the tremor and the sweatings, and an improvement in the nutrition. It was not until later in the treatment that a marked improvement was to be observed in the pulsation, struma, and exophthalmia. We are struck by the not infrequently occurring result that the subjective sense of heart-palpitation had disappeared in spite of the tachycardia remaining almost unchanged. The conditions mentioned can be seen from Table I by comparing the total of improved and unimproved cases in the different groups (a), (b), and (c), when the symptom groups, general condition, restlessness, palpitation of the heart, and tremor, on the one hand, are compared with the pulsation, struma, and exophthalmia, on the other, e. g. with regard to the general condition, where we find

in group (a) 34 imp. .... 8 unimp.  
 » » (b) 34 » ..... 1 »  
 » » (c) 22 » ..... 2 »

against pulsation, where we find

in group (a) 16 imp. .... 22 unimp.  
 » » (b) 22 » ..... 13 »  
 » » (c) 16 » ..... 4 »  
 and so on.

*Table I*

† Synopsis of Charts of Cases of Morbus Basedowii at the Roentgen Hospital of the Serafimerlasarett and at the Radium Hospital in Stockholm.

|   |    | Restitutio<br>ad<br>integrum | Consid.<br>impr'mt. | Impr.      | Tot.<br>imp. | Imp. with<br>relapse | Unimp. | Tot.<br>unimp. |
|---|----|------------------------------|---------------------|------------|--------------|----------------------|--------|----------------|
| Impaired<br>general<br>condition                                  | a. | 2                            | 13                  | 19         | 34           | 1                    | 7      | 8              |
|   | b. | 6                            | 11                  | 17         | 34           | 1                    | —      | 1              |
|   | c. | 7                            | 4                   | 11         | 22           | 1                    | 1      | 2              |
| Restlessness  | a. | 7                            | 2                   | 11         | 20           | 1                    | 7      | 8              |
|   | b. | 9                            | 3                   | 12         | 24           | 1                    | —      | 1              |
|   | c. | 7                            | 2                   | 6          | 15           | —                    | 1      | 1              |
| Palpitation   | a. | 5                            | 2                   | 8          | 15           | 3                    | 4      | 7              |
|   | b. | 7                            | 2                   | 17         | 26           | 1                    | 1      | 2              |
|   | c. | 8                            | —                   | 6          | 14           | —                    | 2      | 2              |
| Local trouble,<br>feeling of<br>pressure, diff.<br>in swallowing. | a. | —                            | —                   | 1          | 1            | —                    | 2      | 2              |
|   | b. | 5                            | —                   | 3          | 8            | —                    | 1      | 1              |
|   | c. | 6                            | —                   | —          | 6            | 1                    | 1      | 2              |
| Pulsation   |    | c:a 70                       | c:a 80              | c:a 90—100 |              |                      |        |                |
|   | a. | 4                            | 6                   | 6          | 16           | 1                    | 21     | 22             |
|   | b. | 5                            | 12                  | 5          | 22           | 2                    | 11     | 13             |
| Struma  | c. | 6                            | 6                   | 4          | 16           | 1                    | 3      | 4              |
|   | a. | 1                            | 2                   | 10         | 13           | —                    | —      | 19             |
|   | b. | 2                            | 5                   | 15         | 22           | —                    | 10     | 10             |
| Exophthalmia  | c. | 6                            | 4                   | 8          | 18           | —                    | 3      | 3              |
|   | a. | —                            | —                   | 2          | 2            | —                    | 6      | 6              |
|   | b. | 5                            | 1                   | 7          | 13           | —                    | 3      | 3              |
| Tremor  | c. | 1                            | 4                   | 3          | 8            | —                    | —      | —              |
|   | a. | 4                            | 1                   | 11         | 16           | 1                    | 10     | 11             |
|   | b. | 5                            | 3                   | 10         | 18           | 1                    | 1      | 2              |
| Loss of<br>weight   | c. | 11                           | —                   | 3          | 14           | 1                    | 1      | 2              |
|   | a. |                              | 7                   |            | 7            |                      | 3      | 3              |
|   | b. |                              | 12                  |            | 12           |                      | 2      | 2              |
|   | c. |                              | 6                   |            | 6            |                      | 3      | 3              |

a. = patient under observation from 1 to 12 months.

b. = " " " " 1 to 2 years.

c. = " " " " for more than 2 years.

For the rest, it seems to me as if observations made agree in the main with those recorded by Professor Fischer.

The difficulties, which the first speaker and myself have called attention to, in diagnosing slight or early cases of Morbus Basedowii so as to distinguish it from other conditions, as well as the desire to have an objective gauge of the intensity of the illness and the degree of improvement or the reverse in the condition of the patient, have led me to watch the records of the patients' metabolic values, which, according to modern opinions, are raised in all cases of Morbus Basedowii.

The assimilation of  $O_2$  during fasting and complete muscular repose has been determined, the resultant value has been converted into calories per day of 24 hours and compared with the standard metabolic values which have been worked out by Harris and Benedict for sex, weight, age and height. I give the resultant deviations from this standard value, as is customary in American publications, in percentages of the standard value with the + or - sign to indicate that the caloric value obtained is respectively above or below the standard value i. e. the so-called basal metabolism rate, or, as I take the liberty of calling it in Swedish, den relativa ämnesomsättningen (R. Ä. O.) The tests were carried out at the Serafimerlasarett, medical clinic II (Prof. JACOBÆUS). In all I made about 90 similar tests, and in support of my diagnoses examined 39 cases, distributed as in Table II.

Table II

|                        | No of cases | R. Ä. O. average | Highest and lowest values in respective groups |
|------------------------|-------------|------------------|--|
| Increased metabolism   | 25          | + 44.6 %         | + 107 %<br>+ 12 %                              |
| Unincreased metabolism | 14          | + 0.4 %          | + 7 %<br>- 7 %                                 |
| Total 39               |             |                  |  |

These cases of Morbus Basedowii represent various stages, part treated, part not treated, and severe as well as slight cases. In about 25 cases the basal metabolism rate test may be said to have decided whether one should diagnose the case as Morbus Basedowii or not.

In 9 Cases the basal metabolism rate tests could be recorded about patients at different dates. I give a brief statement of these.

1. H. L. A lady clerk of 24 was taken ill in Jan. 1921 with sweating, lassitude, restlessness, palpitation and trembling in the hands. She was admitted to the Serafimerlasarett on  $11/5$  and exhibited then moderate symptoms of Morbus Basedowii, with slight struma, glassy eyes (without definite exophthalmia) tremor, moist skin, lymphocytosis and tachycardia (P. = 124) with systolic muomur over the whole heart.

$15/5$  R. Ä. O. + 36 %. Weight, 43 kg. She was nursed at the Serafimerlasarett till  $28/6$ . Weight, 47.5 kg. Has since been resting at home and taken K Br + phosph. natr.  $25/8$ . Patient gets palpitation when walking uphill, and from psychic causes, sweats profusely, slight exophthalmia, moist skin, slight tremor,

slight low-seated struma. Weight, 52 kg. R. Ä. O. + 26 %. Received  $\frac{25}{8}$  to  $\frac{26}{8}$  roentgen treatment (2 × 3 H.)  $\frac{21}{8}$ , R. Ä. O. + 18 %, pulse 98, blood-pressure  $\frac{128}{60}$ ,  $\frac{1}{9}$ , pat. feels calmer, better, no tremor observable. R. Ä. O. + 11 %. Pulse,  $\frac{90}{82}$ . Blood-pressure  $\frac{118}{50}$ ,  $\frac{124}{50}$ ,  $\frac{20}{9}$ , feels free from symptoms. R. Ä. O. + 7 %.

Table III

|               |                        |                        |                        |                        |                        |
|---------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 1. H. L. .... | $\frac{18}{5} + 36 \%$ | $\frac{25}{8} + 26 \%$ | $\frac{28}{8} + 18 \%$ | $\frac{1}{9} + 11 \%$  | $\frac{20}{9} + 7 \%$  |
| 2. A. E. .... | $\frac{26}{2} + 46 \%$ | $\frac{28}{8} + 22 \%$ | $\frac{8}{9} + 18 \%$  |                        |                        |
| 3. E. O. .... | $\frac{6}{2} + 18 \%$  | $\frac{28}{7} + 4 \%$  |                        |                        |                        |
| 4. E. K. .... | $\frac{30}{3} + 54 \%$ | $\frac{6}{9} + 37 \%$  |                        |                        |                        |
| 5. B. B. .... | $\frac{4}{5} + 28 \%$  | $\frac{17}{5} + 31 \%$ | $\frac{7}{6} + 24 \%$  | $\frac{29}{7} + 26 \%$ | $\frac{20}{9} + 31 \%$ |
| 6. A. T. .... | $\frac{15}{3} - 3 \%$  | $\frac{14}{4} - 1 \%$  | $\frac{28}{8} - 2 \%$  |                        |                        |
| 7. C. B. .... | $\frac{11}{8} - 7 \%$  |                        |                        |                        |                        |
| 8. J. L. .... | $\frac{22}{2} + 2 \%$  | $\frac{2}{9} + 3 \%$   |                        |                        |                        |

In this case the patient has consequently been resting for more than 3 months and been under K Br. + phosph. natr. treatment without any marked improvement taking place. With roentgen treatment rapid improvement of both general symptoms and rapid decrease of R. Ä. O. from + 26 % to + 7 % took place.

2. A. E. A servant, aged 41, with Basedow symptoms since 1915, entered the Serafim.-l. on  $\frac{21}{4}$  1920, had then struma, great nervousness, exophthalmia with Graefe and Möbius +, sweatings, pulse 90 when lying in bed, Basedow heart and rel. lymphocytosis, received  $\frac{30}{4}$  and  $\frac{1}{5}$  roentgentreatment (2 × 3 H.) considerable improvement was noted on  $\frac{17}{5}$ , pulse 108, on  $\frac{17}{5}$  and  $\frac{18}{5}$  she received 2 × 5 H., and  $\frac{27}{5}$ — $\frac{28}{5}$  2 × 5 H. The patient improved considerably while under observation Sept.—Dec. 1920, during which period she received 40 H., the struma diminished, also the exophthalmia, pulse 96. She returned on  $\frac{21}{2}$  slightly worse but with pulse down to 76, again treated with 2 × 5 H., and April—May 4 × 5 H. = 96 H. R. Ä. O:  $\frac{26}{2} + 46 \%$  (she was then worse)  $\frac{25}{5} + 22 \%$ ,  $\frac{5}{9} + 18 \%$  with pulse  $\frac{84}{72}$  and blood-pressure  $\frac{180}{95}$  and marked improvement compared with Feb. with inconsiderably enlarged thyroidea, slight exophthalmia, Möbius neg. but Graefe +, slight tremor.

3. E. O. A spinster, 33 years old, who had had symptoms of Morbus Basedowii since 1913, was operated on in 1914, and was well until 1916, when symptoms of M. Basedowii again showed themselves with increase in the size of the struma. Was nursed in July, 1920, at the Serafim.-l., having then pronounced exophthalmia and marked nervousness. Pulse in bed 112; admitted to the Radium Hospital  $\frac{11}{10}$  1920. Was then restless, excessively nervous, had moist skin, diarrhoea, palpitations and tremor. Pulse 120. Möbius, Stellweg and Graefe + +. Treatment Sept.—Dec. 60 H.  $\frac{6}{2}$  R. Ä. O. + 18 %, distinct improvement. Treated  $\frac{9}{2}$ — $\frac{26}{2}$  with 30 H.  $\frac{22}{7}$  feels well, improved eye-symptoms.  $\frac{23}{7}$  R. Ä. O. + 4 %.



4. E. K. Spinster of 37, who got symptoms of Morbus Basedowii at the beginning of 1920; was operated on in June, 1920, and was somewhat better in consequence, but grew worse towards the end of 1920 and roentgen treatment was begun. Condition on 10/1/21: Struma, nervousness, pulse 126, sweatings. Treated in Jan., 16 H.  $\frac{14}{3}$ . Has gained 1 kg. since treatment began, feels calmer, less palpitation and sweating. Struma as before. Pulse 120. Treated in Feb., 8 H.  $\frac{14}{3}$ , unchanged.  $\frac{30}{3}$  R. Å. O. = + 54 %. Weight 67 kg.  $\frac{11}{4}$  worse, now restless, lost 1 kg. Pulse 160. Treated in April 10 H.  $\frac{25}{4}$  improvement. Treated in May—June 25 H.  $\frac{1}{6}$  struma as before, calmer, sweatings almost stopped, gen. cond. good. Treated in Aug. 5 H.  $\frac{6}{9}$ , considerable improvement since the roentgen treatment began, does her work, nervousness much diminished, the only remaining symptoms of illness are occasional palpitations at night. No sweating. Slight tremor. Pulse  $\frac{106}{87}$  Blood-pressure  $\frac{152}{122} / \frac{72}{90}$  R. Å. O. + 37 %. Weight 65 kg. Rec. 64 H.

In these cases, together with the improvement of certain subjective and objective symptoms in the course of the roentgen treatment, we can observe a steady sinking of R. Å. O., and in this we can find, so to speak, a mathematical notation for the degree of improvement.

In contradistinction to the first case mentioned, where the roentgen treatment had caused an immediate sinking of the R. Å. O., I will quote the following case:

5. B. B. A post-office clerk, 27, who had had struma since 1917, which began to increase in size from Oct. 1920. Received strong iodine treatment, which lessened the struma; however, he lost 5 kg. in a few months. grew nervous, and the pulse increased up to  $\frac{90}{100}$ . Was admitted into the Serafim.-I. on 3/5/21; had then struma, tachycardia, and displayed a number of nervous symptoms, eyes a trifle staring, glassy, rel. lymphocytosis, Almén + in urine.  $\frac{4}{5}$  R. Å. O. + 28 %. Treatment: bed, brom. and phosph. natr.  $\frac{17}{5}$  R. Å. O. + 31 %.  $\frac{7}{6}$  condition unchanged. R. Å. O. + 24 %. Roentgen treatment  $\frac{9}{6}$ — $\frac{16}{7}$  = 21 H. After each roentgen treatment the patient's general condition grew worse, more restlessness, night sweating and palpitation.  $\frac{19}{7}$  R. Å. O. + 26 %.  $\frac{20}{9}$  felt subj. considerably better and has been at work since  $\frac{1}{9}$ ; obj. as before, R. Å. O. + 31 %.<sup>1</sup>

As appears, the patient shows a fine consistency in the increase of metabolism during a period of  $2\frac{1}{2}$  months.

The immediate change for the worse in the picture of the illness in connection with the roentgen treatment of the thyroids, which is occasionally to be observed, is finely shown in the case of a married woman of 35, who had had Morbus Basedowii, since 1914, and during her stay at the Serafim.-I. showed strongly pronounced Basedowii symptoms, whose rel. metabolism rose under the roentgen treatment from + 73 % on the  $\frac{26}{3}$  to + 84 % on the  $\frac{16}{4}$ . ( $\frac{21}{3}$ — $\frac{11}{4}$  = 26 H.)

In two cases which, besides certain symptoms of Morbus Basedowii, had shown constitutional asthenia, the basal metabolism rate proved to be exceptionally low after roentgen treatment, (6. A. T. & 7. C. B.) in the one case with about - 2 % and in the other - 7 %. In these cases it would have been of great interest and probably of great importance if the metabolism could have been examined before the roentgen treatment, especially with a view to the question as to how far the

<sup>1</sup> The patient has had roentgen treatment from Sept.—Oct. 1921 and has then worked. He was examined on 13 Jan., 1922. He felt subj. well, had no symptoms of M. Basedowii, the pulse was

$\frac{84}{82}$  R. Å. O.  $\pm$  0 %. The weight had increased by c:a 7 kg.



roentgen treatment can be used. In case 8 (J. L.) two determinations of R. Å. O. were made after the roentgen treatment had been carried out, and these form the normal values.

Finally, I would only call attention, in view of what has been said, to the importance of making sure of the diagnosis in cases of suspected Morbus Basedowii by means of metabolic investigations, and also to the value of being able to note changes in the intensity of the illness in the course of the treatment in an objective manner with this method, and to adjust the treatment in conformity therewith.

3. SEVERIN NORDENTOFT (Aarhus): With reference to Professor FISCHER's admirable lecture, may I be allowed, in the capacity of having asserted myself as a rank outsider, and as sole adherent of the big single doses, to make the following remarks:

In the first place, I do not stand quite alone in this respect, for I have many partisans in Germany, for instance, and certainly in this circle also.

But, in the next place, the alleged divergence between the professor's and my views is less perhaps than it might appear, as his doses are not so very much smaller than mine. When the professor tells us that in 3 % of the cases he sees permanent skin changes then I see evidence of this herein. And the 8-10-12 Holzkeck is perhaps not so much less than my scant HED, as my principle is to avoid skin reaction as far as possible, but to approach the borderland of it. The dissension essentially concerns the smaller beginning doses 5 H, or in severe cases 3 H and the decision may then be dependent on the position as to the question of danger of hyperthyroidism with small doses.

Hitherto very little has been known of the exciting, function-increasing action of small roentgen doses, which seems to be a dogma in roentgen literature, in respect to man; properly speaking, only experimental results from plants and lower animals to judge by.

An isolated communication by NUNNING on the increase of the lacteal secretion on irradiation of the mammae with small doses is only known to me by hearsay, but otherwise not in practice hitherto. But a welcome change has now stepped in through STEPHAN AND BROCK's communications about the pronounced, yes, almost astonishingly exciting and function-increasing action of quite small doses on the spleen, kidneys, thymus, pancreas (provided they are confirmed from other quarters), and it seems to me that in such case they yield an extraordinarily material support to the assumption of a similar action on the thyroid gland.

I would submit the following question for consideration, viz., is the incidental sugar differentiation in the urine after each irradiation in the first of the histories recorded to be interpreted as a sign of exciting, function-increasing action on the Basedow gland?

It seems to me that, if one wants to go cautiously to work in a more serious case, this is best done not by giving a smaller dose over the whole, but by placing a longer interval between the single areas, and I would urgently advise commencing with the *thymus* as the first area. Why?

First, on account of the far greater radio-sensitiveness of the thymus, inasmuch as it is quickly put out of the game; and, second, because there is much that goes to prove that the thymus plays a big part just in the more serious cases. At the time of Dr SÖLLING's debate I remarked that in 18 post-mortem examinations of Basedow patients, who had died after strumectomy, persistence of the thymus had

been noted in 16, whilst no notes had been kept of 2, and it has interested me to see the same noted in one of the 2 sections recorded in Prof. FISCHER's lecture.

But I believe that the prescribed *thymus filters are often too small*. According to BROCK's careful investigations, the thymus of grown-up people may be situated from the lower border of the cricoid cartilage and outwards from the upper border of the clavicles to the 5<sup>th</sup> intercostal room.

Of the cases of death also mentioned by Prof. FISCHER, I would say that the connective cause between them and the irradiation seems to me improbable and I would further point out that in SECHER's case a pancreatic cancer was found at section, in Verning's one case no section, in the other (as usual) a persistence of the thymus which had not been irradiated. I take the opportunity of thanking Prof. FISCHER for the 2 histories recorded by him in this connection; they are very instructive.

In conclusion I beg to say a few words on the subject of *gravidity and Mb. Basedowii*. As we know, the senior physician at Aarhus, Dr. ALBECK, has shown a highly interesting connection between the emesis of pregnancy and the thyroid gland, inasmuch as emesis sets in when the usual hypertrophy of the gland during gravidity is absent and is promptly cured by a dose of thyroidin. One might perhaps expect beforehand that the emesis would not set in during gravidity when Mb. B. was present. In the meantime my investigations upon this question have not absolutely confirmed this, although the emesis in such case is perhaps *somewhat* less prominent. But in connection with STEPHAN AND BROCK's abovementioned investigations it would, I think, be of the greatest interest to try if an exciting irradiation of the thyroid gland with quite small doses could possibly have a curative effect on the emesis, and replace the thyroidin medicines, as one would then obtain confirmation with respect to the capacity of the small doses for producing a certain 'hyperthyroidism'. I have put myself into communication with Dr. ALBECK with a view to instituting experiments in this connection.

Finally, with regard to cancer of the thyroid gland, I must state that I had a case dismissed as inoperable with glandular bulgings on both sides of the neck, which after deep irradiation, has been free from recurrence for 3—4 years, — — — published in Ugeskrift for Laegen with photo of the patient before and after treatment

In our country Dr KROGH has had the merit of showing the increased standard metabolism in Mb. B. and she has interpreted it as an evidence of hyperthyroidism. She has laid stress on the fact that the increase of standard metabolism was a cardinal symptom of Mb. B., the 4<sup>th</sup> besides the 3 classical ones — — — or, if the tremor is included, the 5<sup>th</sup>, and has asserted that where no increase of standard metabolism exists the diagnosis of Mb. B. might be excluded.

It is here that, in my opinion, one should exercise a certain reservation. It is certainly correct that, when no increase of standard metabolism exists, one may exclude hyperthyroidism. But one cannot therewith exclude Mb. B. eo ipso because one has shown that Mb. B. does not exist without hyperthyroidism.

When people believe, even as I do, that the pathogenesis of Mb. B. is intersecretory anomalies in the thymus as well as in the thyroid gland, with predominance first of the importance of one and then of the other gland (although perhaps more often of the thyroid gland), and when one does not consider the purely thymogenic or predominantly thymogenic forms as being so exceedingly rare (especially in men), then one cannot accept the increase of the standard metabolism as an unerring criterion for the conception of Mb. B., for there also exist deter-

minative investigations upon the influence of hyperthymization on the standard metabolism.

Either of the classical symptoms may be absent. There may be Mb.B. sine strumate, sine exophthalmo, sine tachycardia. Maybe there is Mb.B. without increase of the standard metabolism, viz. the thymogeneous forms. At any rate this possibility has not hitherto been precluded.

In this connexion it has interested me to see that in Dr. FRUMERIE's material there were 25 cases in which increased metabolism was found and 14 in which it was not.

One of the cases in which the increase of the standard metabolism was not influenced by roentgen treatment (no. 5) was a man. I would inquire if he had been irradiated on the thymus since the thymogenic forms are, in my idea, particularly frequent in men.

In adding a remark or two to Dr HEVERDAHL's interesting discussion, I will but say that, when he thinks to get a larger quantity of gamma irradiation applied to the deep-seated part of the tumour by radium treatment than by roentgen treatment, on account of the greater hardness or penetration of the radium rays, then there are, I think, two other factors to be taken into account, which means that in a purely theoretical sense one may conversely presume that by suitable and technically correct roentgen irradiation a greater quantity of gamma rays will be obtained in the depth, viz., 1) the inferior intensity of the source of radiation and 2) the much greater equality in the depth quotient with radium. The depth quotient rises, and very markedly so, with the distance; and the distance is just from the fairly short distances to the somewhat longer distances quite extraordinary, between e. g. 1 cm. and 20 cm. absolutely enormous.

4. KAI TRIER (Copenhagen): Since by request of Dr. PANNER, and with the assistance of a medical student, Mr. RASMUSSEN, I have gone through those patients who during 1913—20 have been referred to the Roentgen Clinic of the National Hospital for treatment for Mb. Basedowii, I would like to report the results. I endeavoured to make my investigations as *objective* as possible. They embrace about 200 patients who, in the years mentioned, have presented themselves regularly with a few months interval for examination at the Roentgen Clinic ever since the commencement of the roentgen treatment and after the treatment has been concluded. Of these I have excluded all uncertain cases and *only included* those patients for whom the diagnosis has been *typical Mb. Basedowii*; there remain then 125 patients whom I have personally examined during the last 6 months and spoken to or had a communication about from the patient's medical man in conformity with a question form sent them.

The result is as follows:

53 % have been subjectively cured, i. e. that they feel subjectively quite well and able to work.

Whereas only 26 % out of these patients are both subj. and. obj. cured. i. e. in reality absolutely cured. But it must be remarked that the pulse of most of the latter was somewhat labile.

34 % are subjectively better.

We thus obtain a favourable subj. result of 87 % in all.

11 % have remained subj. unchanged. 2 of the cases which have not been influenced by roentgen treatment have later on been operated and have recovered.

Whilst 2 % have become worse.

In order to get a result *with respect to the effect of the various doses* I have divided the patients into 3 groups, viz.:

1. Those who have been treated with small doses ( $3-5-7\frac{1}{2}$  H,  $3-5$  m/m Al.) for a longer period, on the right and left side of the neck, which are the patients during 1913-17, thus those patients who have been longest under observation.

2. Patients treated with small doses for a longer period, but treated on the thymus as well, which are the patients from 1918 and beginning of 1919.

3. Patients treated with larger doses ( $10-15-20$  H,  $2-3-4$  Sab with  $5$  m/m Al.) for a short time on the right side of the neck and the site of the thymus.

It then appears that patients in the 1<sup>st</sup> group exhibit considerably better results than those in the 2<sup>nd</sup> group, and the latter better results than those belonging to the 3<sup>rd</sup> group.

The reason is perhaps that the 1<sup>st</sup> group has had the longest period of observation, but it may also denote that small doses for a longer period have a better effect.

As to the effect on the single symptoms, I have come to the same result as Prof. FISCHER, namely,

that the *struma* has become smaller or disappeared in  $\frac{2}{3}$  of the cases, *exophthalmos* disappeared or become less prominent in half the cases.

The *pulse* less frequent in  $\frac{2}{3}$  of the cases, but has kept somewhat labile as a rule;

that the *bodily weight* has increased in practically all cases;

I have not succeeded in showing any special *thymogeneous form* among the cases.

Among the material there is no case of death caused by the roentgen treatment.

Nearly all the patients have in addition to roentgen treatment been treated by some other medical method such as rest in bed, hospital care and medicaments etc; and as Mb. B. is a disease which has often a tendency to spontaneous healing and whose course proceeds in a rising and sinking curve, and as patients generally come to a medical man for treatment when they are at their worst, thus beginning spontaneously to recover, I draw the following *conclusions*:

that in connection with my investigations no decisive opinion can be expressed as to the share of the roentgen treatment in the results, but that the roentgen treatment in all probability is an excellent support to the rest of the medical treatment and in many cases gives the necessary impetus to a favourable result of the latter; but that the material shows that roentgen treatment alone is in no way more epochal than any other treatment, and that it has the *advantage* of being free from danger, if correctly administered;

that *small doses for a longer period* appear to have a better effect than big doses for a short period and that the *irradiation of the thymus* does not appear to play any essential part in the result of the treatment.

5. A. REYN, Copenhagen: In entering the discussion I want to add a few words on the dosage. We have treated a large number of cases of Mb. Basedowii in the Finsen Institute. These have almost all been members of the public sick insurance and have been under the same conditions of living before as whilst under treatment. We have used a scheme with small repeated doses and hereby we have obtained good results. As to this point we are all agreed. I wish to emphasize that the most important thing, in treating a disease of this character, is to do the patients no harm. But if a patient, suffering from Mb. B., gets an atrophy

of the skin or only dilatations of the superficial blood vessels, then he has been injured. Therefore I must advise my colleagues most decidedly to use the scheme of small doses, which always gives good results.

Dr. NORDENTOFT said that he uses doses approximate to those producing an erythema of the skin. In reply to this I wish to emphasize the impossibility of applying such big doses so precisely that an erythema would not often occur and hereby permanent skin injuries be produced.

It is my strong opinion that a great risk is connected with the use of filtrated rays in big doses. Even if a visible reaction does not simultaneously appear, teleangiectasis may often occur later on, and in some cases even several years after the treatment has been stopped. I am afraid that in the next years we shall meet with numerous injuries produced in this way by filtrated rays, and therefore I shall advise you most urgently to limit yourself to the use of small doses.

Dr. HEYERDAHL thinks that he has prevented a skin atrophy in the mentioned case treated with radium through a *change of technique* i. e. through a strong filtration. As to this I cannot quite agree with him. Augmentation of filtration offers a protection only providing the dose is not correspondingly increased. Otherwise the risk of skin atrophy will practically be the same. In order to obtain the same therapeutic effect it will prove necessary to increase the doses in proportion to the filtration.

But as to Mb. B. this disease is so benign that we must be absolutely sure to avoid every kind of injury from the roentgen-rays and this we can best do by using small doses only.

6. J. F. FISCHER, Copenhagen: I agree with Dr. REYN when he says that with filtered rays one must be very careful not to occasion permanent skin changes. Metabolic experiments should be made, and every means to determine whether we are faced with a Mb. B. or not should be included in our examinations.

NORDENTOFT's and the *speaker's* views with regard to dosage did not diverge so much as one would have believed beforehand.

The material from the National Hospital corresponded fairly well with my own, fully 80 % showing improvement. Of course a simultaneous medicinal treatment also plays a rôle, but I have several times treated without altering anything in the patient's usual mode of living and have attained good results, and this without the aid of medicinal treatment.

I must state that those who have hitherto spoken shared my views on the importance of roentgen treatment in Mb. B.

7. FLEMMING-MÖLLER, Copenhagen: The question as to the superiority of roentgen treatment to general internal medicinal treatment is not answered by the contributions here made. Before we once for all get the results from a large number of exclusively medicinally treated patients — — and, as far as I know, that has not yet been the case — — and compare with them a like number of roentgen-treated, we cannot come to any decision as to which is preferable. But I agree with Prof. FISCHER when he says that, as conditions now are, one ought to try roentgen treatment in suitable cases, and I can endorse the indications given by the professor for the treatment of the moderately severe and the severe chronic cases but — — and I am now approaching that which has given rise to my remarks — — in order to undertake roentgen treatment we must demand an exact diagnosis, we must be sure that it really is a Mb. B. with which we have to deal, and when the professor

says at the close of his discussion that as to the indications one does not need to be so precise, I cannot quite agree with him. It is the so-called »formes frustes» one has chiefly, in mind, and patients who appear with uncertain symptoms, or a slight swelling of the thyroid gland.

A note of warning should be given against the uncritical treatment of such patients. Unfortunately there are many medical practitioners who, since the roentgen treatment of Mb. Basedowii has been so much spoken about, have the idea that as soon as one comes across a patient with a swollen thyroid gland, he should at once be roentgen-treated. But this is absolutely mad — and I emphasize the point because, strangely enough, we have not yet awakened to this fact here. With each particular patient in this class we must be sure that Mb. B. is present before commencing treatment; otherwise we can do much harm. We must be quite sure that the existing glandular swelling is the consequence of a hyperfunction of the gland, and is not due to a simple struma, for if it is a simple struma then roentgen treatment is contra-indicated. The simple struma is a genuine swelling of the thyroid gland. Here the glandular tissue has atrophied and as a consequence of this one may be justified in presuming a hypofunction of the gland, which with roentgen treatment is further increased, and perhaps with but a very small dose the result may be myxoedema.

One must be very careful before starting roentgen treatment without further ado, and it is this point that I wish to emphasize.

8. S. A. HEYERDAHL, Christiania: It is due to a misunderstanding when Dr. NORDENTOFT says that I hold the opinion that radium gives larger doses in the depth than roentgen rays. — This is the opinion of Dr. AIKINS, of Canada, as will be seen by the printed lecture. — This utterance must thus be accredited to Dr. AIKINS.

I would inform Dr. REYN that I have not seen pronounced telangiectases and skin atrophy from the radium treatment of Mb. Basedowii, but only in simple struma and malignant struma for which one is often compelled to give big doses in order to get sufficient ray action.

I advocate moderate doses for Mb. Basedowii.

9. K. FRUMERIE, Stockholm. With reference to Dr. NORDENTOFT's enquiry as to whether the male Basedow patient, that I had alluded to, had received roentgen irradiations on the thymus, I beg to state that such has not been the case. Neither has he exhibited any certain signs of the thymus being involved in his disease.

That I have such a large number of metabolic examinations of strumata, which have not thereby exhibited any increase of metabolism, is due to the fact that among the cases sent to me there are such a large number of patients that have not had any trouble from their struma, but have consulted a doctor for cosmetic reasons. The material is as yet too small.

Dr. EDLING said in his lecture that he did not attach so very much importance with regard to watching the tremor; I myself, on the contrary, believe that the tremor is a symptom which maybe parallelly accompanies the increase of metabolism and is therefore of interest to follow; the metabolic increase is in all probability brought about by an increased tonus of the muscular system of the body (shown, among others, by Dr. MARIE KROGH), for which increased tonus the tremor presumably constitutes an expression. I have seen cases where clinically there was no tremor to be observed in the hands, but when a mouthpiece, belonging to the respi-



ratory ventilator used at the metabolic experiment, had been placed in the patient's mouth, I have been enabled to observe a smooth, finely-waved tremor in the harmonica tubes leading from the respiratory ventilator. This tremor was probably conducted from the patient, but could not be observed until the amplitudes had been sufficiently enlarged in the harmonica tubes. In those cases in which such a tremor has been observed, the metabolism has been increased.

10. TH. EIKEN, Copenhagen: I will unconditionally join the adherents of small repeated doses, because, among other things, according to forthcoming evidence, one obtains just as good results as with the larger doses.

That I have risen to speak to make such a short remark is mostly to do honour to the man who was certainly the first in our country to make use of this treatment: Dr. KUHN FABER. I have opportunely procured information about the cases treated by him at Professor ROVSING's roentgen clinic. Most of these patients were cured or improved and extremely satisfied with the result attained.

11. S. NORDENTOFT Aarhus: When the question is raised as to eventual unsuccessful cases after roentgen treatment of Mb. Basedowii, a general roentgen poisoning is pleaded or a hyperthyroidism — a »roentgen sickness» occurs, of course. But when faced with grave cases or even a case of death it will scarcely serve as an explanation. For one can hardly speak of more serious changes in the blood picture or of any »roentgen poisoning» on the whole, of any importance at all, with the short duration of irradiation and the small areas concerned. And the roentgen poisoning, which is credited with exercising an influence on the flowing blood, should be proportional to these two things: to the time (in connection with the distance, i. e. the dose per surface) and the irradiated area (or, rather, the cubic content) of tissue. — And both factors are naturally small in Basedow therapy.

According to STEPHAN AND BROCK's investigations the exciting doses are very small, less than one would expect beforehand, down to  $\frac{1}{10}$  HED in the gland. It may appear difficult to come down so far. But just when one frightens folk with the danger of larger doses is the risk increased of their going down so far that an exciting action takes place.

I would inform Dr. REYN that, up to date, I only know of 2 cases of permanent skin changes in my material of about 150 cases and that one is reputedly far more liable to permanent skin changes by oft-repeated small doses than by few bigger ones. I firmly believe that strong filtration implies protection of the skin, and I thought this was universally acknowledged.

As to hyperthyroidism, I will only say that even if the danger of it is slight with small doses, yet it exists all the same. And unfavourable consequences of roentgen treatment are, moreover, rare. But if such occur now and again then one must put two questions: 1) Has the thymus been irradiated and 2) has the thyroid gland been so overcautiously and scrupulously irradiated that one has come down to the excitation dose?

12. GÖSTA FORSELL, Stockholm: My *experiences in the radiological treatment of changes in the thyroid gland* may be summed up by stating that it is possible to bring the glandular tissue of the thyroid gland to a state of degeneration or atrophy by irradiation with roentgen rays as well as by means of radium. The essential difficulty of the technical as well as of the therapeutic problem is not to produce a *destruction* of the thyroid tissue. The problem is not essentially concerned either with the question: How can I permanently reduce the function of the thyroid gland without permanently injuring the skin? Even this problem ought not



to be so difficult to solve in view of the present radium- and roentgen technique. The problems which are nowadays of fundamental importance for the radiological treatment of Mb. Basedowii lie on quite another plane. Certainly further investigations must be made touching the doses to be given in order to produce a sufficient and permanent *reduction* of the abnormally increased function of the thyroid gland, with the object of attaining as far as possible a *restitutio ad integrum*, but also and above all to determine the doses that *shall not be exceeded*, that a reversion to an irreparable *hypofunction* be not produced through a too extensive degeneration of the gland. I know by experience in the radium- and roentgen treatment of *malignant tumours* in the *thyroid gland*, where larger doses have been given, that a *reversion to myxoedema may take place through atrophy of the thyroid gland*. In some cases I have observed slight symptoms of hypofunction and dysfunction after the roentgen treatment of Mb. Basedowii. Herein lies the great difficulty, namely, in keeping the total dose outside the threshold of that value which brings the risk of hypofunction in its train, the result of which is, that the dose is often too scantily measured out of fear of over-dosage. *On the other hand, I have not observed with any certainty that symptoms of irritation have arisen from the use of too small doses.*

We must remember that the radiological treatment differs widely in character from that of the surgical. The surgeon removes the greater part of the thyroid gland but leaves a certain portion of it behind without affecting the remaining part of the gland.

It is quite a different matter in the case of roentgen treatment.

Even if we do not irradiate one part of the gland with roentgen treatment, then it is impossible on account of secondary irradiation to *absolutely* protect any part of the gland. The *irradiated* portion of the gland is not removed but is *changed* in build and function. Certainly we know that the change essentially consists in a reduction of the hyperfunction, and a reduction of the glandular substance, but we cannot as yet get a definite idea as to in what measure not only a *hypofunction* but also possibly a *dysfunction can be produced by* irradiation of the remaining glandular tissue. Besides which, we know too little as yet about the *mode of action* of the roentgen rays and of the therapeutic mechanism in roentgen healing.

Another problem is, to find out the cause of why in apparently similar cases with the same treatment no result is attained in a certain number of cases, whilst in the majority of cases, again, the treatment proves successful. It is possible that this circumstance is owing to a diversiform change in the thyroid gland in different cases of Mb. Basedowii with a consequent different degree of sensitiveness in different forms of the Basedow struma.

As is shown by all the statistics here advanced to-day, *we have obtained important results in the treatment of Mb. Basedowii by the cautious technique which is usually employed in Scandinavia.* The experiences gained by metabolic experiments urge us to advance with still greater caution than hitherto, guided by the changes in metabolism, *without, however, letting these signs alone be the determinative factor.* It is certainly not advisable to treat hyperfunction of the thyroid gland by giving very large single doses. Much still remains to be discovered in respect to the mode of action of roentgen rays on the Basedow struma as well as in respect to the technical treatment; but a careful observance of the course of the disease during the treatment, and an exceedingly cautious development of the technique seem to me to be the roads by which a further development of the roentgen treatment of Mb. Basedowii are to be gained.

#### IV. G. Forssell, Stockholm: Studies of the Mechanism of Movement of the Mucous Membrane in the Digestive Canal

The  *folds of the mucous membrane of the stomach* generally are supposed to be caused by a  *passive folding*  in as a consequence of the contraction of the muscular coat ( *Muscularis propria* ). The origin of the folds of the mucous membrane of the  *intestines*  is partly explained in the same manner, partly the folds are supposed to be  *permanent*  anatomical structures ( *»Dauerfalten»*  according to German authors). The author has proved that this prevailing opinion is not correct, the folds of the mucous membrane of the alimentary canal being formed by  *active movements of the mucous membrane itself* . On several series of roentgen pictures of the stomach, of the duodenum and of the different parts of the intestines, the author has demonstrated that the  *same*  part of the stomach or of the intestines, although retaining the same diameter,  *is able to vary entirely the folds of its mucous membrane as to number, position and form of the folds* . By direct observation and by serial photos of an exposed part of the mucous membrane of the ileum and of the colon in patients suffering from intestinal fistulas the author has also demonstrated great fluctuations of the relief of the mucous membrane independent of the contractions of the muscular coat. In anatomical preparations of the digestion tract of man, hardened with formaline shortly after death, the author has also found the varying forms of contractions of the mucous membrane observed in the roentgen pictures. With the aid of the anatomical preparations, there is no difficulty about distinguishing on the roentgen pictures the impressions of the outlines caused by contractions of the muscular coat from the typical folds of the mucous membrane. Even the duodenal bulb, that is generally described as being without folds of mucous membrane, shows a highly varying relief of the mucous membrane on the roentgen series as well as on anatomical preparations.

The muscular coat ( *Muscularis propria* ) models the exterior form and the width of the digestive tube, but has no mechanical qualifications for a  *localized and individual*  folding of the mucous membrane. The  *Muscularis mucosae*  forms the  *special contractible organ of the mucous membrane*  which, being attached to this one and to the submucous layer, is able to displace the mucous membrane in all directions by means of transversel, longitudinal and oblique fibres.

The  *mass*  of the mucous membrane and, consequently  *the volume of its folds*  ought to be regulated by  *variation of the filling of the vessels* , while  *number, position and form of the folds*  being determined by the muscular system in the  *Muscularis mucosae* .

The forming of a high and close folding of the mucous membrane may occur more easily with a simultaneous contraction of the muscular coat ( *Membr. propria* ), but a definite degree of contraction of the muscular coat does not produce a definite corresponding relief of the mucous membrane; on the contrary, a stage of contraction, producing a certain width of the muscular tube, can be associated with a relief of the mucous membrane varying from an even surface to a very complicated folding.

The movements of the muscular coat determine the rough division and the large displacements of the contents of the stomach and the intestines. The movements of the mucous membrane produce an extremely differentiated distribution of the food in digestive chambers of varying form and size and procure the fine regulation of the current by the passage of the contents in the alimentary canal.

According to the present general opinion about the anatomical nature of the folds of the mucous membrane, an exclusively *passive* function is attributed to them, the folds only being supposed to have the purpose of enlarging the digestive surface and of preventing a too rapid flow of the intestinal contents. The knowledge that the folds of the mucous membrane do not consist of passive structures, but represent a *momentary state of movement*, must apparently involve a *new appreciation of their function*.

The whole rigid world of folds and furrows becomes alive and proves to be formed by independent motor forces, that may be of great importance for the mechanical regulation of the digestion. It is apparent that the complicated relief of the intestinal mucous membrane, not only forms a passive depositary for digestion and resorption of the food, but constitutes a mechanism with a subtle and wonderful organisation for regulation of the chemistry of the digestion.

The rôle that disturbances of the motor mechanism of the mucous membrane may be playing in the *pathology* of the alimentary tract is not yet investigated and great difficulties may occur in working out this problem. At any rate it is necessary, by studying the pathology of the alimentary tract and, especially, by interpreting the roentgen pictures of the intestines, to remember that the relief of the mucous membrane, not being a fixed structure, represents a state of movement.

Great experience and a thorough comparative investigation is necessary before we are able to distinguish the pathological types of the relief from the normal ones, and to separate the outlines formed by defects or infiltrations of the intestinal wall from the relief of a contracted mucous membrane. Probably new fields will be opened here for medical research.

Will be published in extenso in Acta Radiologica.

## V. Åke Åkerlund, Stockholm: Das Nischensymptom bei Carcinoma ventriculi

Published in Acta Radiologica. Vol. I. Fasc. 3, p. 274.

## VI. Th. Eiken, Copenhagen: Clinical Examinations on 4 Hours' Roentgen Retention

Published in Acta Radiologica. Vol. I. Fasc. 3, p. 262.

## VII. Aage Als Nielsen, Copenhagen: Roentgenological Examination of the Motility of the Stomach in healthy Individuals during Rest and Motion

Published in this issue.

### Discussion to lectures VI and VII:

1. GÖSTA FORSELL, Stockholm: In reference to Dr EIKEN's observation that a *retention* has taken place in the majority of those cases in which, according to his definition, a *gastroptosis* has occurred, i. e. where the lesser curvature is situated

below the navel plane in upright position, I beg to emphasize the fact that this does not agree with my own experience. Those stomachs, the lesser curvature of which is situated below the navel plane, do not generally show retention after 4 hours unless the stomach is otherwise changed.

I must therefore ask Dr EIKEN, first, if among the so-called gastropnoeses he has only included *normal* stomachs, or if he has also included *atonic* ones among them, in which case retention is, of course, easily accounted for. Further, it would be of interest to know how large a percentage of women has been included among the so-called gastropnoeses and if, with respect to the women, the menstrual period has been taken into consideration, since, as we know, women's stomachs not infrequently show a delayed emptying in connection with menstruation.

Finally, I would lay stress on the point that, in *judging of the retention, one must pay regard not only to the opaque medium employed, but also to the meal given*. The *thin fruit-juice cream* used in Sweden as a medium of suspension for the barium sulphate only contains 50 gm. of potato starch. The digestive work of the stomach is reduced to a minimum with this meal, and the emptying time is in all probability but very slightly dependent on the digestive capacity of the stomach. After consumption of a large portion of *rice porridge*, the emptying time is, on the contrary, dependent in no small degree on the digestive capacity of the stomach, inasmuch as the emptying time is not only an expression for the function of the emptying-mechanism of the stomach, but also in a material degree for the digestive capacity.

2. TH. EIKEN, Copenhagen: Owing to shortness of time there are many things which I am unable to include in my little lecture. My material embraces both men and women of various ages. Respecting the inquiry about gastropnoesis, I have here only desired to investigate into the manner in which a low-lying (drop) stomach empties.

I cannot agree with Dr ALS NIELSEN when he sets 5 hours as the limit for the emptying time of the normal stomach. He has a low figure and the conditions under which his patients have been examined are not particularly comparable with those under which patients exist when in bed. After my investigations I must absolutely keep to a 4 hours' limit as the most favourable. I believe that it will be shown to be fairly equal in value to a 6 hours' Bourget-Faber retention, and that a 4 hours' roentgen retention and a 8 hours' Bourget retention is a favourable combination. In those cases in which there is no 4 hours' roentgen retention there is scarcely ever a 8 hours' Bourget retention either, and therefore in such cases the latter can be done without, whereas it will be a valuable supplement in those cases with a considerable 4 hours' roentgen retention.

3. AL. NIELSEN, Copenhagen: In reply to Dr. Eiken's remark that a 4 hours' retention is to be considered pathological, may I refer to 6 women with healthy stomachs who were confined to their beds. In these cases the stomach did not empty until  $4\frac{1}{2}$  hours after. My investigations have led me to believe that the stomach empties more slowly during confinement to bed than when one is up and about, and these women, as previously remarked, were not confined to bed for the whole of the examination period. I therefore think that the numbers should be raised somewhat, giving an average of about 5 hours.

## VIII. M. Simon, Stockholm: On the Roentgen Picture of the Jejunum

With respect to roentgen diagnostics, then the jejunum is the most indefinite of all the different parts of the digestive canal. The normal picture varies so in its appearance that no one has ventured to distinguish as pathological any of its less marked deviations in form.

Only the most pronounced changes, e. g. extreme stenosis, diverticle formations and post-operative peptic ulcer have been the subjects of roentgen diagnosis.

The normal jejunum picture is described in the literature as forming shadows shaped like snow-flakes, feathers, narrow ribbons, strings of pearls, etc. During the transport through the intestines the contents are at times collected in small lumps which often exhibit slight valvular impressions.

KÜFFERLE considers that the valves are seen especially distinctly for long distances in cases of increased tonus through mechanical or chemical irritation.

According to STIERLIN a continuous filling of the jejunum does not normally occur for a longer distance than that of a finger's length; the width is said not to exceed an inch.



Fig. 4.

Stierlin thus expresses the limited value of the roentgen diagnosis of jejunal complaints, »the severe symptoms of stenosis of the small intestine, are almost the only hitherto roentgenologically observed symptoms of disturbed motor function of the small intestine.»

In a paper in *Hygiea* 1916 I have tried to show that it is not only possible to observe roentgenologically pronounced stenosis in the lower ileum, but also a slight commencing strangulation there.

Of late years I have had my attention directed towards the possibility of finding roentgen signs of a pathological condition even in respect to the jejunum.

In one case, which I had some years ago for roentgen examination, of suspected ulcer pepticum jejuni, I found an unusual type of valvular

impression in large portions of the jejunum. As the case exhibited besides fairly typical signs of the ulcer formation mentioned, I was able at the operation to obtain an immediate explanation of the observed picture of the mucous membrane. The case was operated on by Dr DAHL and is to be found published in his paper: *Étude sur l'ulcère peptique jejunal postopératoire*. The mucous membrane of the jejunum was voluminous, as it generally is in the stomach, and the valves were higher than usual.

In pathologico-anatomical manuals the occurrence is mentioned of a hypertrophic catarrh in the jejunum. After experimental gastroenterostomy on dogs, DAGEW found in one case a pronounced catarrh in the jejunum in the neighbourhood of a peptic ulcer. In the surg. literature I have not found — previous to DAHL's — any mention of such thickened mucous membrane in cases without a pronounced stenosis.

On the contrary, on published clichés of resection specimens (i. e. PATERSON and HABERER) I have found mucous membranes which suggest a similar change to that in DAHL's case.

In the roentgen literature on the jejunum and especially on the ulcer pepticum jejuni (CARMAN, BALFOUR, FREUD, BERBERICH, etc.) I have not found any mention of the diffuse membranous change in question.

The roentgen picture in my cases appertaining hereto have presented the following appearance: (see figs.

4. and 5.) the jejunum is more continuously filled than usual with or sometimes without an increase of the breadth of the shadow to fully 3 cm. The most characteristic feature is the appearance of the valvular impressions, which are considerably broader than usual. As on measurement of a large number of normal cases they were shown to be about 1—2 mm. broad, and only at single places up to about 3 mm., yet they attained a width of 3—4—5—6 mm. or more for long distances of the jejunum in those cases which I considered to be pathological. These broad impressions are most often shallow. They give a direct suggestion of being due to thick ridges in the mucous membrane, which agrees very well with the description in DAHL's 3 operated cases and with the picture from resection specimens. With respect to the examinations of the relief-change of the mucous membrane (recently expounded by FORSELL) through self-movements, one must reckon with the possibility of the ridges being due not to real hypertrophy but to contraction of the mucous membrane.

Even if such is the case, their occurrence may indicate a pathological condition of the intestine, possible to prove roentgenologically.

My material, collected in the endeavour to settle this question, consists of all barium meal cases at my institute during the course of 2 years up to April, 1921, amounting to almost 900 cases. Through the kindness of Prof. Forsell I have, besides, had the opportunity of going through several gastro-enterostomy cases from his private roentgen institute.

In those cases which have presented the recently described picture I have perused the clinical journal, eventually accounts of operations and sections, and in many cases I have made after-examinations after the patient's discharge from the hospital;



Fig. 5.



all this in the endeavour to find out what pathologico-anatomical change it has been which has given the roentgen finding.

As was expected, there was among the gastro-enterostomy cases the greatest number of jejunum pictures of suspected pathological type.

Whilst the broad type of valvular impressions were only confirmed in 5 cases out of 850, which had not been operated on, they occurred in 16 out of 45 cases in which gastroenterostomy had been performed.

With respect to the pathological process, the 45 operated cases were divided in the following manner:

1) 5 operatively verified cases of ulcer pepticum jejuni.

All these showed typical broad impressions.

2) 6 clinically as good as certain cases of similar ulcers.

Even all these showed the same picture of the mucous membrane.

3) 9 cases with clinically uncertain peptic ulcer.

Only one of these showed typical impressions.

4) 14 cases of g-e performed for ulcer without suspicion of ulcer jejuni.

Likewise a single case with impressions.

5) 10 cases of g-e for ventricular cancer.

3 cases with broad impressions.

The 5 cases with broad impressions in the non-operated series had clinically the following pathological abdominal changes: 1 case of certain diffuse cancer, 1 case of probable diffuse adhesions, 3 cases with a strong suspicion of one or other of these diagnoses.

As this change in the mucous membrane appears to be particularly general with ulcer jejuni I have inspected the published pictures of similar cases, and consider I have found the same picture in the majority of copies from CARMAN, BALFOUR, HESSE etc. CARMAN's last work especially, with its 51 cases of ulcer jejuni from the Mayo Clinic — which did not come to hand until after my own work was in the main finished — gives, with its excellent clichés, a splendid opportunity of confirming that the mucous membrane picture, as described by myself, really seems to be easy to prove in practically all cases of ulcer pepticum jejuni.

Even if these broad valvular impressions may constitute a new and indirect sign of ulcer pepticum jejuni yet I will by no means maintain that they are pathognomonic of this complaint. It is rather certain that they can arise under various conditions of irritation in the jejunum. It is also certain that they are usual with ulcer jejuni but rare with other conditions. In all probability they correspond to that type of membranal thickening observed by Dahl at his operations. They are possibly due to contractions of the mucous membrane, but in such case of a particularly constant type.

These impressions possibly indicate some condition of irritation preceding the occurrence of a post-operative peptic ulcer. If such is the case the appearances noted should serve as a warning to prescribe a more careful diet in proportion as this mucous membrane thickening can be proved after gastro-enterostomy; the roentgen picture would then serve a prophylactic purpose.



## IX. M. Simon, Stockholm: Some Gall-stone Cases of Roentgenological Interest

There is no doubt that European roentgenologists have too long underestimated the importance of a roentgen examination for the verification of gall concretions. It is to the merit of the Americans that we also nowadays try to demonstrate shadows of such concretions, whose density but slightly exceeds that of the surrounding soft parts.

With the increased frequency of positive diagnoses the number of patients remitted for gall examination has risen appreciably, so that even our home material is beginning to be sufficient to enable us to judge of the value of the method. It is plain that the old views with respect to the high lime percentage of the American stones does not hold good (HAENISCH, LEDOUX-LEBARD). Both these authors have, moreover, later declared that with the more modern technique they obtain positive diagnoses just as often as the Americans do.

My material from about one year amounts to 100 gall-stone examinations. Of these I considered that in 28 cases I could make a practically certain diagnosis of stone. 17 out of the 28 were operated on with a verification of the roentgen diagnosis in all cases.

In 39 cases more uncertain roentgen signs of stone were found; uncertain shadows resembling concretions, shadows with the appearance of the gall-bladder projecting downwards from the margin of the liver, impression of this shadow on the right margin of the bulbous or canalis. 11 out of the 39 were operated on with stone findings in 4 cases; in a further 4 cases the roentgen diagnosis agreed so far as the biopsy revealed enlarged gall-bladder in accordance with the roentgen finding. The roentgen examination was considered negative in 39 cases.

The following cases were demonstrated:

1. An autoptically controlled case with such faint gall-stone shadows that the density bordered on that observable on the roentgen plate. The patient had immediately before been roentgen-examined elsewhere with other technique (f. ex. a harder tube) with negative result.
2. A case in which several plates showed 4 faint stone-resembling shadows lying close to each other. On operation only 1 big solitary stone was found which, however, on nearer inspection appeared to consist of differently coloured parts of different age. Similar mistakes in respect to the number of stones can probably never be entirely avoided in certain cases.
3. A case with a distinctly visible hazel-nut-sized stone within the shadow of the gall-bladder. This latter was denser than usual and exhibited a certain granulation of the shadow; on operation there were found besides the nut-sized stone a hundred or so small stones which plainly could not furnish strong enough contrast to appear on the radiograph each one by itself, but which through summation of their shadows produced an increased density in the not fully homogeneous shadow of the gall-bladder.
4. A case in which I had already 5 years ago confirmed 2 pea-sized, apparently calcareous shadows in the gall-bladder region; in a recent radiograph these shadows were still seen, but now lying 3 cm. nearer to each other. These shadows seemed localised to the fundus of the gall-bladder, and could not apparently constitute the cause of the icterus from which the patient had suffered for a month or two. On operation 2 spanish-nut-sized, extremely porous stones were found in the ductus



Fig. 6.

tion the stones were distributed along the whole length of the long bladder, where they lay in so thin a layer that the separate stones could be distinctly identified.

7. A case in which the roentgen examination gave indications for operation in a case of clinically typical stone complaint, where there was no question of any operation until a radiograph showed that a spanish-nut-sized stone, constant in different positions of the body, retained its place in or immediately outside the neck of the gall-bladder. The fundus was marked by an equally large stone and the area between these two large ones was filled up by a quantity of small, very faint concretion shadows, partially faceted (see fig. 6.). The first-mentioned stone was found incarcerated in the first part of the cystic duct.

Owing to lack of time at the lecture the technique employed was not described; an account of it is, however, given below as an abstract from the discussion.

### Discussion

1. H. J. PANNER (Copenhagen): Dr. SIMON enquires as to the posture assumed by the patient during examination. I myself have derived most benefit from an examination of the patient in the supine position with ventro-dorsal direction of the rays, not only with the more distinct annular shadows but also with the diffuse, fine, most often circular shadows which frequently cast surprisingly little more shadow than do the surroundings.

I believe that the comfort afforded the patient by this position more than makes up for the advantages which the prone position offers in other respects.

2. LARS EDLING (Lund): I have had the opportunity of roentgenologically examining a large number of gall-stone cases, but have obtained a positive result in relatively

choledochus; they appeared on the plates as indistinct dense spots, which could not be identified until after the stones removed had been compared with the plates.

The slight density was demonstrated on a plate when the stones were radiographed on a normal hand.

5. A case with the roentgen picture of an enlarged gall-bladder, verified on operation, with 2 good pea-sized shadows resembling stones within it. At the operation no stones were found, but an unusual liver cyst formation, some cysts partially covering the gall-bladder. When a removed piece was radiographed, the cysts were found to be doubly as dense as the tissue of the liver.

6. A case with compact stones, which in the supine position showed a continuous, pigeon-egg-sized, dense shadow; in the prone position

few of them. I have thereby found that the stone shadows may be classified according to the following different types:

1. Multiple, compact, generally rounded shadows, arranged in a group resembling a bunch of grapes or in a row according to the width of the gall-bladder; these stones mainly consist of calcium salts.

2. Multiple, cubical or polygonal shadows, for the most part of the shape of a bunch of grapes and visible only as annular figures. Here it is a question of cholesterol stones with secondary deposits of bilirubinate of lime; these latter constituents only are visible in roentgen pictures. In my cases both these categories of stones have been found to lie in the gall-bladder.

3. Large, annular (generally oval) or quite opaque shadows occurring singly or by twos or threes. Shadows of this kind are due to stones in the fundus as well as in the neck of the gall-bladder. In one case, where two annular stone shadows appeared, I have been able with probability to diagnose concretions in both these places, my opinion being based on the distance which existed between both the shadows.

4. Single, very large, rounded, annular shadows. I have seen a case of this kind with a more than walnut-sized, very faint, partly defective and irregular shadow in a case where the clinical diagnosis was between gall-stone and kidney-stone, and where the roentgen examination determined the therapeutic interference. I will point out that this differential diagnosis in cases with large solitary stones can be made at times by the shape of the stone only, as round stones of this size (cherry-sized or larger) do not occur in the kidney pelvis where great concretions without exception assume the shape of the pelvis.

5. Finally, I have met with cases with a collection of innumerable small concretions of the size of a pin's head, or even smaller, which fill the bladder more or less entirely. In one of these cases they were in the form of a fine powder, reminding of the bismuth precipitation sometimes found in the stomach after ingestion of a bismuth meal. The shadow given by this substance was of considerable density but had very diffuse outlines much the same as faecal shadows. The diagnosis was established by the constant return of the shadow on the same place, although with varying shape.

As to technique, I always use prone position, often with a flexion of the body towards the left to get the gall-bladder tract as extended and flattened as possible. I prefer compression technique from two or more directions. As we know, radiography in prone- and supine positions is of the greatest importance for the differential diagnosis between bladder- and kidney-stones. Kidney-stones are always more compact, sharper and smaller in supine position, gall-stones vice versa.

3. M. SIMON (Stockholm): In reply to Dr. PANNER's question as to my technique for gall-stone examinations, I consider most decidedly that a dorso-ventral radiograph affords the best possibilities of showing concretions, even when these exhibit a very insignificant salt percentage.

I consider it especially important to take dorso-ventral plates with different degrees of ray-penetration, and in several positions of the anticathode: posterior, oblique-inferior, oblique-superior, eventually with the upper part of the body raised and the tube very much oblique, superior-external. In this last-named position the kidneys are projected so far medially and downwards that one can determine as to whether a concretion belongs to the kidney- or gall-bladder region.

Very often concretion shadows are to be found only in 1 or 2 of the positions mentioned, very likely due to the fact that the single stones are too thin to appear

on the plate each by itself. Only through the summation of several stone shadows will the density prove sufficient. The conditions for such over-projection may, of course, be better in one position than in another — — differing somewhat.

The examination is concluded in all cases with barium-filling of the stomach and bulb, on the major side of which the gall-bladder often gives a typical impression, especially in a supine position with the left shoulder elevated.

Quite as important as taking many plates and giving oneself plenty of time at the exposure is procuring the best possible light at the inspection of the plates. Only thus will one get a positive result in a large number of cases in which the stones do not cast dense or typically annular shadows.

One may count as positive those cases in which there are to be found on several plates faint, even homogeneous shadows within a downward rounded shadow shaped as an enlarged gall-bladder and projected at its usual place — — of course, if the colon is quite certainly projected farther down. If the colon obscures the gall area, then a control examination must be made a few days later after a laxative has been given.

## X. H. Laurell, Upsala: On Pneumopertioneum after Operation

Author had shown air in the abdominal cavity after operation in 8 cases. In 2 cases the air was not resorbed until about 3 weeks afterwards. 6 out of the cases concerned operations in the upper portion, 2 in the lower portion of the abdomen.

Will be Published in extenso in Acta Radiologica.

## XI. J. F. Fischer, Copenhagen: A Case of Hepatoptosis

### Discussion:

1. H. LAURELL (Upsala): Demonstrated the plate of a case of hepatoptosis and sketches of a further 2 cases. All the cases concerned men, 2 old, 1 middle-aged, and 77, 74 and 47 years respectively. In case no. 1 the liver was displaced forwards and had sunk very much in consequence of an interposition of the colon between the diaphragm and the liver. The vena cava inf. was seen beneath the diaphragm for several cm. in extent. The oesophagus even as the vena cava was very much displaced forwards. The gullet lay close to the heart in the usual manner, but between the oesophagus and the aorta an unusually broad space was found. The liver appeared to be small; the large intestine was gas-filled to great extent. In the supine position the liver lay in normal fashion against the diaphragm; in the upright position the liver sometimes retained its normal position in relation to the dome, but as a rule the gas-filled intestine floated up like a floating-dock between the diaphragm and the liver, separating the liver from behind. Also in one of the more pronounced cases the colon, filled with opaque substance in upright position, sank below the liver, whilst on gas-filling the intestine rose again.



Fig. 7.



Fig. 8.

2. LARS EDLING, Lund: In connection with Professor FISCHER's lecture I beg to say a few words about a case of partial dystopia of the colon which does not coincide with the conception of hepatoptosis, but which on account of its great rarity seems to me to possess special interest.

It concerns a man, now in his 74<sup>th</sup> year, who for the greater part of his life has suffered from various kinds of intestinal trouble.

History: Nothing of any interest regarding heredity. At the age of 18 years (1865) a right-sided strangulated inguinal hernia; a fistula remained for many years after the operation, which was not closed until 1896 through a fresh operation performed because of symptoms of intestinal stenosis. During the years 1904—12 he was several times treated for intestinal trouble, and once or twice operated on for renewed symptoms of stenosis.

During 1914—15 chronic obstipation with trouble resembling ileus, pains in right lumbar region, and mucous stools. After hospital attendance he was quite well again until the end of 1920, when he got flatulency and pains in his right side; irregular evacuations of the bowels, often with discharge of mucous, took place, gradually terminating in obstinate obstipation. Considerable emaciation. Admitted to the Medical Clinic in Lund, March, 1921.

On the previous occasion in 1915 as well as now the patient was subjected to a *roentgen examination*, the result of which is given in a brief account below.

27/1/15. Opaque enema. The rectum filled to a considerable width before the contents penetrated up into the sigmoid flexure. This latter was very long, rather wide, and formed a big loop in the left iliac fossa. No signs of intestinal stenosis, nor any striking changes in the proximal portions of the colon, excepting that the hepatic flexure lay unusually high and was somewhat wide.

16/3/21. The opaque enema filled the colon without meeting with any obstruction. The previously described large sigmoid flexure was again found to be unchanged (see fig. 7.) and even those parts of the colon proximally adjacent were now

strikingly wide. The splenic flexure lay at the left diaphragm, the transverse colon crossing from here over the 3<sup>rd</sup> lumbar vertebra in a direction towards the right abdominal wall. The hepatic flexure was, finally, extraordinarily large and wide, horseshoes-shaped, extending right up to the arch of the right diaphragm which it followed for some little way. On fig. 8., which was taken in an oblique-posterior direction from the right, one sees that the whole of this loop is located *at the back of the liver*. From the diaphragm it curves down along the spine, passes obliquely downwards right behind the transverse colon and ends in a wide and lumpy caecum, located in the upper portion of the iliac fossa. The flexure retained this situation even in upright position, the caecum sinking downwards but very slightly.

This protracted history is marked by 2 special periods. The first one manifestly refers to the inguinal hernia with its sequelae — intestinal fistula and adherent peritonitis — and is distinguished by symptoms of stenosis in the small intestine, which seemed to have disappeared after the last operation. From 1914 the disease assumed another character with symptoms indicating colonic trouble. Judging from the roentgen pictures it would seem that the colon had been rather large and wide from the very beginning and had of late years developed further in the same direction (megacolon); this was especially the case with the hep. flex. the displacement of which behind the liver during the interval between the two examinations had been increased. Such a dislocation implies a fully developed mesocolon which is not usually found in this part of the intestine. Possibly the unusual length of the hepatic coronary ligament has also contributed hereto. Very likely the flexure was fixed at this place since it retained its situation even in upright position. At any rate this change is probably to be regarded as a link in the continuous and general increase in size of the intestine, which constituted the foundation of the clinical symptomatic picture.

## XII. T. Klason, Stockholm: Radiologische Methoden zur Bestimmung d. Conjugata vera

Published in Acta Radiologica. Vol. I. Fasc. 3, p. 308

## XIII. H. J. Panner, Copenhagen: A Peculiar Characteristic Metatarsal Disease

Published in Acta Radiologica. Vol. I. Fasc. 3, p. 319



## The second meeting

September 25, 1921

### XIV. G. Forssell, Stockholm: Demonstration of Two Apparatus for adjusting Roentgen Tubes in Therapy

Will be published in extenso in Acta Radiologica

### XV. S. A. Heyerdahl, Kristiania: Treatment of Malignant Tumours with Radium Needles

Published in Acta Radiologica. Vol. I. Fasc. 3, p. 358

#### Discussion:

1. LARS EDLING, Lund: Docent HEYERDAHL's lecture has been of extraordinary interest and it seems to me that this communication is of special importance for radium institutes with limited resources, where it is difficult to procure sufficient quantities of radium for the preparation of emanation treatment. With respect to the theory of the action of radium needles, then the explanation of STEVENSON in his first publications (Brit. Med. Journ. 1914) in connection with emanation needles probably holds good for these also: through such applications of closely and equidistantly inserted needles the same conditions of irradiation throughout the entire substance of the tumour and its surroundings are procured as on the surface, in contradistinction to external application where, owing to the effect of the *dispersion*, the irradiation of the deeper layers becomes much weaker, whilst the outer layer always becomes over-irradiated. Owing to the relatively slight quantity of radium in each needle, the risk of necrosis is greatly diminished in comparison to what is the case when the larger tubes are inserted. It remains to be seen whether such radium needles are durable enough to be relied upon without running the risk of losing the radium.

2. S. A. HEYERDAHL, Christiania: With reference to Dr. EDLING's discussion as to the quantitative and qualitative difference in radium treatment, I will only say that it is obvious that there is a great *quantitative* difference, whether the tumour be treated with external or internal application. By external application more than the half fraction of the ray is absorbed by the air. In addition to this the stronger filtration of rays by external application deprives the tumour of a large part of the effective radium rays.

The quantitative difference does not, however, seem to me to account for the astonishing results that may be seen from needle treatment (or emanation treatment) of certain malignant tumours.



## XVI. J. Heyman, Stockholm: Résultats du traitement des hemorrhagies climacteriques par la radiumthérapie dans la clinique de Radium

Published in this issue

## XVII. Birger Lundquist, Stockholm: The Radiotherapeutic Treatment of Uterine Myomata at the Radium Home, Stockholm

The roentgen treatment of myomatous hemorrhages was begun by Professor Forsell in 1907, but the result with the primitive technique at hand was, as everywhere else, unsatisfactory, with but a 50—60 % of good results.

In 1913 the deep technique proper began with filters of 3 mm. Al and the measurement of the dose on the skin. At the commencement a so-called full dose per area and series was given, but this soon went up to 2 and afterwards 3 and finally 4 full doses per area and series. A natural transition to the present technique was herewith given ... serial irradiations with filters of 4 mm. Al or 0,5 mm. Cu and per area and series a dose of 10—15—20 H with Al or 10—20—30 H with Cu, with a parallel spark-gap of 35 cm. With this technique amen. was attained with 1—3 series and an average dose of 65 H.

The deep roentgen material embraces the time up to July 1, 1920. The indication for treatment has been menorrhagic hemorrhages and tumours of at most the size of a man's head, the largest reaching up to 2 fingers' breadth above the navel. The result concerning the hemorrhages is:

|              |                 |
|--------------|-----------------|
| amen.        | 22              |
| improved     | 7               |
| unsuccessful | 1 (early case). |

4 cases with medium-sized myomata, in 1 case occasioning trouble in urination, in another vague pains, have been radiated with the intention of reducing the tumours. In 2 cases the myoma was reduced considerably after the amen. had set in, in the third no reduction in spite of amen., in the fourth, a patient who was already climacteric beforehand, no change set in.

A diminution of the tumours has taken place in 80 %, and this often very quickly, from a few weeks to a few months after the occurrence of the amenorrhea.

As complications to the irradiation we have only had skin injuries, but never more severe than a peeling off of the epithelium. Twice after treatment had been started necrosis has made its appearance, both cases belonging to the primitive technique. The patient had received a skin dose of 12 and 20 H respectively, calculated after filtration. In all probability it may be precluded that the necrosis has been a consequence of the treatment, more especially as menorrhagic hemorrhages are found in the anamneses, which denote that the necroses had existed previous to the irradiation.

The radium treatment of myomata began in 1913 and the material up to July 1, 1920, embraces 61 cases. In the first 48 an intra-uterine method of treatment

has been employed, in the last 13 a vaginal one. The result of the intra-uterine method — 40 mgm.  $\text{RaBr}_2$  18—20 hours... is:

amen. 26  
improved 7  
unsuccessful 15

The favourable results have been obtained in  $\frac{2}{3}$  of the cases with 1 treatment, in the remaining ones with 2, with exception of one case in which 3 treatments have been given.

With regard to the unsuccessful cases, 2 have gone away after 1 treatment unimproved, the remaining 12 have been operated. In 3 cases the failure was due to submucous myomata which were exposed and extirpated 2—4, 5- and 9 months after the treatment. In 9 cases there is no explanation to be found of the failure other than that the dose was probably too weak. In 2 cases, 4 and 11 months after the treatment, necrosis was found in a myoma projecting in towards the cavity uteri, doubtless caused by the insertion of radium. In one case a tube containing 75 mgm.  $\text{RaBr}_2$  with an extra filter of 2 mm. Pb had been inserted for 22 hours, in the other case 6 tubes of 10 mgm., inserted after each other in pairs in a rubber tube, had been employed for an equally long period. Microscopically, the ovaries were found to contain undamaged follicular tissue, in other words, in spite of a dose that had brought about necrosis of the myoma, the ovaries had not been effectively influenced.

We have treated by radium such tumours as have been at most as big as a foetal head. A reduction of these has been observed in  $\frac{3}{4}$  of the cases.

In connection with the intra-uterine insertion, fever has set in in 9 cases, of which 5 have been absolutely uneventful, the others with a more prolonged but benign course.

The last 13 cases have been treated by a vaginal method. Under the impression that the intra-uterine method implied a risk in certain cases, but also to avoid the circumstantial and by no means reliable intra-uterine palpation, which always premised the intra-uterine insertion, we decided to try the vaginal method... 100 mgm. in the vaginal fornix with filtration of 3 mm. Pb.

The result of the 12 cases treated in this way (apart from 1 that disappeared) is.

amen. 5  
improved 6  
unsuccessful 1, probably due to too weak a dose.

The cases treated by the vaginal method have only been kept under observation for 1 year.

As to the reduction phenomena, corresponding values are found from the roentgen- and radium material. It is especially interesting to note that these figures closely resemble those from the material of operatively castrated cases which, for the sake of comparison, I have included in the following table:

*Vasomotor reduction phenomena*

|                              | Roentgen | Radium   | Operation                |                        |
|------------------------------|----------|----------|--------------------------|------------------------|
|                              | 35 cases | 25 cases | ovar. extr.<br>136 cases | ovar. left<br>78 cases |
| No reduction phenomena ..... | 17,1 %   | 12 %     | 19,3 %                   | 54,4 %                 |
| slight .....                 | 34,3 %   | 44 %     | 33 %                     | 28,4 %                 |
| troublesome .....            | 48,6 %   | 44 %     | 47,7 %                   | 17,2 %                 |

Roentgen therapy in its present form affords good results; good results may perhaps be expected in all cases of uncomplicated myomata. Practically speaking, it is free from risk and it is relatively independent of the size of the tumour and the displacement of the ovaries, which implies the possibility of calculating beforehand the necessary dose and the effect of a given dose.

In radium therapy the position of the ovaries i.e. their distance from the source of radiation, plays a decisive rôle. Thus on theoretical grounds we have restricted its use to tumours that have been at most the size of a foetal head. This is, to be sure, a considerable limitation of its applicability. The intra-uterine method involves a certain if no very great risk of necrosis of the projecting or submucous myoma and the results from this cannot compare with those from roentgen treatment. Broadly speaking, one must therefore say that roentgen therapy has decided advantages, from a medical point of view, to radium therapy in cases of myoma. In the choice of a method of ray treatment, however, viewpoints of a social and economic nature must sometimes be taken into account, which, in certain cases, may render the radium treatment more advantageous.

An improvement of the results from radium therapy, e. g. by developing the vaginal method or by combining the vaginal and the intra-uterine methods may, it is granted, change this standpoint,

The position for indication between an operative or a ray treatment is in our opinion the following:

With regard to the troublesome reduction symptoms, women of a procreative age should not be irradiated but operated, conservatively as far as is possible, otherwise radically, leaving the ovaries in tact, especially as the risk of operation is but very slight (our mortality figures are 1,3 % for the radically- and 1,4 % for the conservatively operated).

Only women approaching the climacteric age are suitable for ray treatment. Best suited are such with menorrhagic hemorrhages and uncomplicated myoma.

Menorrhagic hemorrhages, caused as they generally are by submucous or necrotic myomata or by malignant complications, are regarded by us as an indication for operation, with reservation for the lastnamed complication, which, in certain cases, may be treated by radium.

Cervical and intra-ligamentary myomata ought as a rule to be cases for operation, likewise cases with inflammatory complications.

Roentgen treatment may possibly be tried for myomata which, by reason of their size, occasion trouble; but in the majority of cases they ought, well, to be operated. Firstly, the effect of the irradiation with respect to the reduction in volume of the tumour is uncertain and, secondly, it is, well, seldom that such a forcible diminution of the tumour is to be expected that a patient with a big myoma would be free from trouble.

### Summary

Roentgen-treated with deep technique... 3—4 mm. Al or 0,5 mm. Cu with a parallel spark-gap of 35 cm. ... 34 cases, of which 30 on account of menorrhagic hemorrhages, with the result of 22 amen., 7 improved, 1 unsuccessful; and 4 cases with medium-sized myomata with the intention of reducing the tumour. This succeeded in 2 cases after the amen. had set in, in 2 not, in spite of amen. in one of them. Radium-treated by the intra-uterine method 48, by the vaginal 13

cases. The results of the the intra-uterine method (40 mgm. RaBr<sub>2</sub> 18—20 hours): 26 amen., 7 improved, 15 unsuccessful.

A reduction of the tumours has taken place in 75—80 % of the cases with roentgen- as well as with radium treatment.

The results of the vaginal treatment (100 mgm. in the fornix with 3 mm. Ob.): 5 amen., 6 improved, 1 unsuccessful, 1 disappeared. The reduction phenomena are the same after roentgen- and radium treatment as after operative castration. Roentgen therapy is preferable to radium therapy.

On account of the troublesome reduction symptoms, only older women ought to be ray-treated, and in general only such with menorrhagic hemorrhages. Menorrhagic hemorrhages constitute as a rule an indication for operation. Cervical and intra-ligamentary myomata are preferably operated; likewise cases with inflammatory complications. For tumours which occasion trouble by reason of their size, roentgen treatment may be tried... younger women excepted... but, in the first place, the effect of irradiation with respect to the diminution of the tumour is uncertain and, in the second place, it is, well, seldom that such a forcible diminution in the tumour is to be expected that the patient thereby would become free from trouble. Big myomata ought, therefore, as a rule, to be operated upon.

## XVIII. S. A. Heyerdahl, Kristiania: The Treatment of Myoma Uteri and Menorrhagia with Radium and Roentgen Rays

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### Discussion to lecture XVI, XVII and XVIII

S. NORDENTOFT, Aarhus: In connection with the lecturer's interesting communication, may I be allowed to call to mind the handsome contribution given by the roentgen irradiation of myomata and the metropathies towards our knowledge of the interno-secretory relations of the ovary and the theory of menstruation.

It was the strange variations in the result when producing permanent amenorrhoea by one irradiation in one sitting — — permanent amenorrhoea sometimes setting in immediately without any more bleeding being seen at all, and sometimes not until one or two, yes even 3 more menstrual flows had set in, sometimes even a particularly excessive flow; and further permanent amenorrhoea setting in immediately subsequent to an irradiation during or just previous to menstruation, but not appearing till later on if irradiation were given in an intermenstrual period, — — — that led Seitz, Wintz and Fingerhut to advance their admirable theory as to the double function of the corpus luteum, first as open and then as closed gland, and their representation of the two antagonistic hormones, the agomensine and the sistomensine. Roentgenology has hereby perhaps made its best contribution in the service of theoretical physiology, and led to the definite solution of this old problem that has engendered so many varying hypotheses. But conversely, investigation into these variations and their cause has given roentgenology valuable practical assistance as to the juncture at which irradiation should prefe-

rably be administered (even if it unfortunately plays one false when the menstrual flows are so irregular that the original menstruation type is quite lost).

These factors certainly explain many of those cases where the result does not appear so good, since after treatment — be it with roentgen or radium — bleeding sets in anew, maybe even excessive and dangerous bleeding, after ray treatment. This is certainly not always to be regarded as a »relapse» or as »an unsuccessful case», and certainly one should not always repeat the treatment. Where one is certain that the dose has been effective — and no special circumstance exists that can account for considerable displacement of the ovaries — then one may quietly bide one's time and not allow oneself to be discouraged by renewed bleeding. If one only waits it will often be seen that permanent amenorrhoea sets in. There are cases illustrating this in a marked fashion. I remember one in which, in order to attain amenorrhoea in climacteric bleeding, I applied 1350 milligram-hours radium or the fourfold of the dose prescribed by Dr. Heyman of 350 milligram-hours, yet nevertheless a very severe bleeding set in, and again a month later an excessive flow which entailed hospital care and consultations as to operative interference. But then it ceased and permanent amenorrhoea set in — in a patient only 39 years old.

It is, of course, not my meaning that the circumstance mentioned should be the only explanation of the unsuccessful cases, but one of them at least. And if in such cases one is led to repeat the irradiation, then *maybe* for that very reason stronger emanation symptoms will result.

## XIX. Axel Westman, Stockholm: Altérations du sang chez les malades traités par les rayons X et par le radium

Published in Acta Radiologica. Vol. I. fasc. 3, p. 349

### Discussion:

1. S. NORDENTOFT (Aarhus, Denmark): In connection with the lecturer's mention of the influence on the organism of the resorption of the tumour tissue, and its share in the blood changes, I would call to mind those cases — not exactly everyday occurrences yet by no means so rare — in which (e. g. in extensive abdominal metastases from testicular- or ovarial sarcomata) an extraordinarily rapid resorption of big tumour masses may be seen, so that positively kilograms of tumour tissue can disappear within the course of a few days, often with surprisingly slight or, rather, no general reaction. Blood examinations would be very desirable in such cases, by way of finding out how far the general changes and the blood changes are to be attributed to roentgen action and how far to tumour resorption.

2. A. WESTMAN, Stockholm: In the treatment of sarcoma the same blood reaction is found as in cancers of the uterus; there is often, however, a higher lymphocyte value, probably to be ascribed to the sarcoma being richer in lipoid substances the resorption of which — according to BERGHEI's investigations — is mainly provided for by the lymphocytes. The eosinophile curve resembles that from cancers.

**XX a). Edv. Collin, Copenhagen: A Study on the Roentgen Aspect of Tuberculosis of the Joint and its Relation to the Clinical Aspect, especially when under Treatment by Universal Light Baths**

Published in this issue

**XX b). Edv. Collin, Copenhagen: The Treatment at Hospitals by Universal Light Baths**

Will be published in Acta Radiologica

**Discussion:**

A. REYN, Copenhagen: I wish to thank Dr COLLIN for his paper. I want to draw the attention to the importance of a thorough systematical training of the nurses who shall administrate the treatment with light. Irregularities in the function of the lamps may often occur during the treatment, that can only be redressed by a nurse, fully familiar with the technique, and also accidents with the patients themselves, that require the help of a nurse, trained in the light treatment.

During many years the Finsen Institute has educated and trained a large number of nurses and the Institute also undertakes with pleasure the education and training of nurses from hospitals and from private doctors who are about to establish facilities for light treatment. Especially for the administration of the local treatment ad modum Finsen and Finsen-Reyn a special education of the nurses will prove absolutely indispensable. We regard a course of two months in the Institute as a minimum for obtaining a sufficient training.

As to the position of the radiotherapeutist, it is my opinion that he must always be in the most close co-operation and contact with the doctors of the different clinical departments of the hospital, but that the supremacy shall be given to the latter in all special cases of doubt. Even if the radiologist himself thinks his therapeutic results rather good, still he must be aware of the fact that some other kind of treatment might give just as good results and therefore it should always be left to the hospital surgeon to choose the treatment in all the single cases.

As soon as I got aware of the value of chemical light baths by coal arc-light for the treatment of surgical tuberculosis, I asked Dr. ERNST to accept an appointment as surgeon in the Institute to give us a reliable comparison between the treatment with light and that with other kinds of treatments.

The same principle ought to be adopted for the medical diseases, children's diseases etc. Also I suppose that this will prove the best way to interest the surgeons, who are certainly not always in sympathy with radiotherapy.

Dr. COLLIN mentioned a lamp with a special long arc. According to my personal experience, however, I think this lamp of no value at all. The long arc system is intended to get its principal effect from the light arc itself, but the power of the arc is only a subordinate one in comparison with that of the crater light and the power of the crater light has just been considerably reduced in lamps with a long arc, due to the high electric tension required for them.



Nor I have got any confidence in the »Solluxlamp» which is only a kind of improved »artificial daylight» similar to the improved incandescent lamps constructed by Bach. All these alterations have not really improved the mercurial arc-light and it is actually confessed openly that this lamp is inferior to the coal arc-light.

## XXI. A. Scholander, Helsingborg: A case of Lupus Mutilus

On the 20<sup>th</sup> of this year I was consulted by a man, aged 18 years, suffering from a skin complaint on his left hand. No heredity for tuberculosis existed. At the age of 4 years the patient had had nodules on his left hand. These gradually subsided and healed, leaving scars behind. Fresh nodules appeared. The fingers were deformed and bone fragments fell off from the middle and third fingers. The patient was unable to give any exact information respecting the time when this happened. Gradually nodules and a rash appeared on the elbows, knees and inner aspect of the thighs. The patient had never had any pains in the affected parts nor any nervous symptoms either.

On inspection, the dorsal aspect of the left hand exhibited patches of a bluish-violet colour on an otherwise brownish discoloured skin. On the dorsal aspect of the wrist there were diffuse pale greenish-yellow, verrucose connective formations on an infiltrated base. Still more pronounced cutaneous changes were found on the distal aspect of the forefinger and the dorsal aspect of the middle phalange and over the base of the dorsal phalange. Similar changes besides along the ulnar border of the third finger and the hand.

In addition there existed an extension contracture of the fourth finger in the metacarpo-phalangeal articulation and flexion contractures in the phalangeal articulations (dermatogeneous contractures).

There was but a stump 4 cm. long remaining of the third finger, with no active but abnormally passive mobility. The finger was, for the rest, clumsily swollen, succulent and of a pronounced brownish hue. On the middle of the dorsal aspect a superficial, diffusely defined ulceration, larger than confetti.

There was only a clumsy jointless rudiment 3 cm. long left of the second finger.

The forefinger exhibited an extension contracture in the metacarpo-phalangeal articulation and a flexion contracture in the first phalangeal articulation.

The thumb had an extension contracture in the phalangeal articulation and a small oily ulceration at the root of the nail.

The nails were more or less deformed. The nail of the middle finger rudimentary.

Healed or practically healed up processes with whitened scar tissue were found on the rest of the body, viz., on the left underarm, on the inner aspect of the knees, on the inner aspect of the left thigh and on the anterior aspect of the right knee. On the left elbow was seen a brownish violet infiltration with greenish-yellow verrucose formations.

No marked changes in the lungs, heart or nervous system. Urine: Albumin 0, s-r 0.

The roentgen examination (see roentgenogram) showed slightly deforming changes in the joints on the joints engaged by the contractures. The distal half of the basal phalange of the third finger and the proximal of the middle phalange were missing. The distal end of the basal phalange and the proximal end of the middle phalange



were prolonged in a tapering fashion and exhibited increased density of calcification at these places. There remained but the proximal  $\frac{2}{3}$  of the basal phalange of the second finger and the proc. unguicularis of the terminal phalange. The distal end of the stump of the basal phalange was prolonged like a claw with increased density of calcification. The three ulnar metacarpal bones were each about 1 cm. shorter than the corresponding bones on the right hand. The capituli metacarpi as well as (although less) the basal ends on the basal phalanges exhibited a coarse-meshed bone structure. There existed besides a moderate osseous atrophy of the bones of the hand.

Judging by appearances, a healed-up, destructive bone process.

A test-excision was made from the changed parts of the skin on the left hand. The pathologico-anatomical examination showed: fine miliary tuberculous seats in the inflamed, irritated subcutis.

The epithelium proliferated somewhat in the shape of plugs (LINDAU).

Wassermann was negative.

The patient started a roentgen treatment on  $\frac{20}{a}$  with 2 H 26 cm. distance, 0 filter,  $2\frac{1}{2}$  Mamp. The scleroma 130 6—10 days' pause. 3 treatments in the series. On  $\frac{17}{a}$  fresh treatment with 3 H and 3 mm. Al. On  $\frac{20}{b}$  slight roughness remaining and brownish discolouration. The ulcerations healed.

The picture of disease thus showed a cutaneous disease connected with mutilation, combined with similar skin changes on other parts of the body. Thus in making a diagnosis the angioneurotic, mutilating forms, likewise diabetic gangrene, may readily be excluded. The fingers bore more resemblance to syphilitic processes, especially the purulent form of phalangeal periostitis. But the anamnesis, negative Wassermann, the roentgenogram and the confirmed miliary tuberculous seats in the test-excision argued against this diagnosis. There then remained but leprosy and lupus mutilans. They bear a great resemblance to each other, with absence of atrophy, anaesthesias and symptoms from the central nervous system generally; but to a certain extent even the appearance of the skin changes spoke in favour of a lupus mutilans. This form of lupus occurs now and again in the hands and feet, but is comparatively rare. On going through a 40 years' observation material from v. BRUN's Clinic, KÜTTNER could only come across 4 cases of mutilating hand lupus. LANGENBECK demonstrated a case at the 14<sup>th</sup> surgical congress as being the only one observed by him himself. At the same time, however, DOUTRELEPONT pointed out a more frequent appearance of this form, as it is also called epithelioid lupus in



Fig. 9.

the Rhine districts. Casuistic contributions have since been made by several authors such as, HUTCHINSON, LESSER, NOBEL, etc.

As far as I am aware of, only one or another chance case has been observed in Scandinavia.

The site of predilection for hand lupus is generally the back of the hand and the dorsal aspect of the fingers. By the healing up of the *less complicated lupous forms*, hyperextension contractures develop without exception over the metacarpophalangeal articulations, but the joints and bones are not directly engaged by the process.

The *epithelioid (verrucose) form* may, again, be recognized by a lively, epithelial proliferation and partial ulceration and it is this type which, by attacking the joints and bones, gives rise to mutilation.

These lupous affections have been traced back in single cases to inoculation of septic tubercles from corpses and lesions of various kinds.

It is characteristic of lupus mutilans that it is often combined with lupous and tuberculous processes in other parts of the body, which may be of importance to remember when making the diagnosis. Left to itself the process slowly advances during a partial healing up, producing a fairly high degree of invalidity. As a rule, the patient has to put up with his complaint until death releases him. Formerly surgical treatment predominated, the object of which was, firstly, to replace by transplantation the tuberculously changed skin and, secondly, by correction or eventually by amputation of the fingers to reduce the invalidity. We have now obtained new weapons in Finsen and Roentgen against this disease.

Of the two, Finsen treatment is undoubtedly superior to roentgen treatment, although good results are seen even with the lastmentioned.

#### Discussion:

A. REYN, Copenhagen: No doubt the case demonstrated by Dr. S. is a case of »Lupus mutilans». I only wish to draw the attention to the fact that a negative result of the W. T. does not exclude the diagnosis syphilis with nodular affections of the skin. Even rather large nodular syphilitic eruptions may give a negative W. T. I emphasize this fact because I have very often seen such patients treated for lupus, due to a negative W. T. The same may be the case with the histological examination. The microscopical picture of a syphilitic nodule in the skin is so much like that of a tubercule, that it will often prove completely impossible to differentiate them. In such cases inoculations in animals may be of great value. At all events it is unsuitable to treat such syphilitic eruptions with light or with X-rays and therefore in all doubtful cases a short antisyphilitic treatment ought to be established. This treatment will soon give the diagnosis.

## XXII. S. Nordentoft, Aarhus: On the Treatment of Brain Tumours

Published in this issue

#### Discussion:

1. S. A. HEYERDAHL, Christiania: Described a method of treatment for cerebral tumours which has been recommended by Dr. Magnus and carried out in several cases. The treatment consists in trephining over the tumour or, in a case of hypo-

physis tumour, of both temporal regions and afterwards X-ray treatment or treatment with radium. — The results have been so encouraging that Dr. Magnus will continue and carry out this method of treatment for those respective brain tumours which cannot be operated upon.

In a case of angioma cerebri (case no. 70 in *Dr. Magnus'* work: Contribution to the clinic of brain surgery and results) — — a 39-year-old woman who, in the autumn of 1911, had an attack of aphasia, unconsciousness and general tonic cramps, later on several similar attacks with spasmodic jerks in both legs, — — trepanning was performed in Sept. 1913 with exposure of the angioma (5—3 cm. in size); subsequent radium treatment.

Was 4 times radium-treated in 1914, — after this the rather marked bulging which corresponded to the trepanation opening disappeared — — in 1914, 1915 and 1916 she had 5 epileptic attacks in all, later no attacks (Dec. 1st, 1920).

2. E. BERVEN, Stockholm: I remember a case of a woman of about 30 years who had clinical symptoms of a tumour in the left motor region with paresis in her right arm and leg, epileptiform attacks and increased pressure. She was operated on, and at the operation a diffuse tumour infiltration was found in the left motor region, which was interpreted as a glioma. An exploratory incision was not performed. Extirpation was considered impossible and the patient was sent for roentgen treatment.

After a couple of roentgen series the general condition improved, the paresis retrogressed and the patient was quite able to work. After 3 years the epileptiform attacks began again and they were now scarcely influenced at all by the roentgen rays. After a time the patient died in a status epilepticus.

On section there was no tumour found either macro- or microscopically and only a slight hyperaemia in the brain.

3. H. J. PANNER, Copenhagen: Have treated no few cases — — patients which had been operated in advance with decompensating trephining, as well as those which had not been operated on.

I do not believe have seen a single case that was cured, whereas there were several apparently temporarily improved.

I therefore agree with the lecturer inasmuch as one should treat those patients which cannot be operated with roentgen, as one can at any rate hope for improvement in single cases. Other treatment is not possible either on the whole.

In conclusion, to Dr. Heyerdahl's contribution I will add that we have also treated a patient suffering from a hypophyseal tumour with considerable subjective as well as objective improvement. He was quite blind in one eye, and had a very limited visual field in the other. Simultaneously with the subjective improvement, a great increase in the visual field was shown. A change for the worse took place again which did not respond to renewed treatment with roentgen rays. Trephining had not been performed previous to roentgen treatment.

I shall not further discuss here the roentgen treatment of acromegaly which forms a special group by itself, giving, it is true, a considerably better prognosis in such respects than other brain tumours do.

4. J. FR. FISCHER, Copenhagen: The results with respect to brain tumours from the Communal Hospitals in Copenhagen have not been better than those at the National Hospital.

I would urge Dr. Nordentoft to describe the technique as precisely as possible in order that one may see if the differences between his results and those of others may be due to differing technique.

5. S. NORDENTOFT, Aarhus: With respect to acromegaly- and hypophysis tumours it is quite true that roentgen therapy is older than it is for brain tumours. In my first communication I have expressly referred to acromegaly, and advanced the argument that as this was amenable even to primitive roentgen treatment, then true brain tumours must be so also.

I should like to point out the analogy between the Wassermann Reaction in lues and »Radiation Reaction» in tumours, especially cerebral tumours. Neg. W. R. is far from always excluding lues; likewise negative reaction on radiation of a brain complaint does not go to prove that it is a tumour but by no means excludes it, as there may be a non- or slightly radio-sensitive tumour present. Positive Wassermann signifies with far greater certainty that lues exists, sources of error being comparatively few. Likewise a positive result on radiation of a brain complaint is almost a certain sign of tumour, as one is in a quandary if one suggests sources of error. It is an excellent diagnosticum ex juvantibus.

As to operation, a sharp differentiation must be made between an attempt at radical operation, and the simple decompressatory trephining which may be made almost anywhere without regard to the localisation of the tumour. It should be the mission of radiotherapy to replace the former for the most part: the second may be to a certain degree replaced by it but not so completely, nor with so much support, because, among other things, a decompression operation is such an easy and safe interference. It is often a very doubtful question whether to do it or not. Oculists as a rule mostly urge a trephining, and I have myself performed this in several cases on the oculist's representations, and where there is a severe form of stasis papilla, and when it is in a state of rapid development, one cannot very well take the responsibility of neglecting to perform it. On the other hand, you will find among the histories reported not one but several cases, in which even a severe stasis papilla has retrogressed *quickly* after radiations, and the eyesight has been considerably improved. At any rate one should not let oneself be led away by the decompression operation, which has been performed, to wait even a few days with the radiation, when it is an advanced case. It is very, very urgent, as a patient with brain tumour — especially if it is in the posterior cranial cavity — may die at any moment without necessarily exhibiting any alarming symptoms. Two of my patients never got so far as to receive radiation, as mors subitanea set in beforehand during the examination period at the hospital.

As to technique, it must be emphasized that the cerebrum can stand surprisingly big roentgen doses. There is nothing astonishing in this, because it concerns highly differentiated tissue as far as possible removed from the foetal type, which according to Bergoné Tribondeau's theory *a priori* must thus be supposed very resistant.

For the rest, technique has been and probably will be very differently individualised. Where there has been a careful and certain diagnosis of localisation (as e. g. in angular tumours which, by-the-by, can scarcely be expected to belong to the most favourable objects) one can apply a very large number of converging small fields which all meet in the tumour, the position of which is exactly known. Something similar holds good for cerebral tumours, but here a very careful adjustment is necessary, and without a cranial model, in which the site of the tumour is marked

phantom-like, it will prove very difficult. If the localisation is, on the contrary, uncertain or lacking, then one must radiate the whole caput as in figs. 18 and 19 with e. g. 5 large filters with depth-technique, and at a great distance. When Professor Fischer enquires about future epilation, then I must acknowledge that e. g. the young lawyer in case no. 18 has only a few lanugo hairs scattered here and there. But, in the first place, one must balance this against a complaint of such a serious nature and in the second place, the wigmaker's art — — even if it does not stand on quite such a high level as during l'ancien régime — — may be relied upon.

In reply to the question as to whether any of my patients have died in status epilepticus, I must answer no.

In reply to Professor Fischer's question regarding the distance, I may answer: at least 30—40 cm.

### XXIII. J. Bagge, Gothenburg: On Electrocoagulation

#### Discussion:

E. BERVEN, Stockholm: I have tried the coagulation method in 3 cases of mammary cancer. The first case was a woman, aged 85, who had a cancer of the size of a large goose-egg adherent to the skin, with commencing infiltration. Owing to the laxity of the breast, we could squeeze off the base of the mamma with intestinal forceps. The whole mamma was afterwards coagulated and was cut off with a knife. The coagulation was performed by sticking in active knife-electrodes in various directions into the tumour. The whole operation was done without any bleeding whatever. The wound was closed with silk sutures. After a fortnight the burnt crusts began to loosen with a copious secretion, and after a month all crusts had fallen off and the wound was covered by fine granulations. Epithelialization progressed from the lips of the wound. The healing process went very smoothly. The patient was up after 5 days. No glands in the axilla. The patient receives roentgen treatment.

The second case was a woman, aged 61, with an inoperable right-sided mammary cancer. The tumour was located in the upper portion of the mamma and measured  $6 \times 5$  cm. It was very closely adherent to the m. pectoralis. The surface of the tumour was ulcerated. A subcutaneous cancerous infiltration, about 1—2 cm. broad, at the upper margin of the tumour. A gland of the size of a hazel-nut in the axilla. The coagulation of the tumour was performed, after which the coagulated part was cut away. A pronounced tumour infiltration was felt in the m. pectoralis major, extending medially as far as the third costal cartilage, to which the infiltration was adherent. The coagulation was continued deeper with flat electrodes and the medial third-part of the pectoralis major was coagulated away. The coagulated surface was quite as big as the palms of two hands together and an attempt was made to draw the edges of the wound together with silk sutures. (After operation there was a slight rise in temperature up to  $38.5^{\circ}$  C. for a few days.) As early as 4 days after the operation a copious secretion from the wound began, with stagnation of the secretion in the lower portion, which formed a pocket. The sutures were therefore cut. On the 13th day the coagulated superficial layers fell off almost simultaneously, exhibiting underneath a fine granulated surface. On the 19th day granulations had risen almost on a level with

the skin and the epithelium began to grow down from the lips of the wound. The third costal cartilage and the most medial portion of the third rib lay exposed and the superficial parts will probably fall off. The glands in the axilla were no longer felt.

The third case was a woman, aged 62, with a hard, nodular tumour the size of a hen's egg adherent to the *m. pectoralis major* and to the skin. No glands. The patient received a pre-operative roentgen treatment. One H. E. D. with copper filter at the distance of 40 cm. The coagulation was performed 2 months after the roentgen treatment, By means of 2 active knife-electrodes, placed opposite each other, the base of the tumour was coagulated, after which successive detachment of the coagulated portions was achieved, by aid of a sharp knife, without any bleeding. The tumour being removed, an oval defect, of the size of the palm of the hand, remained, which was left open. The walls and bottom were coagulated with flat electrodes to the extent of quite 1 cm. in depth. 10 days after the operation the coagulated portions began to loosen and the wound to granulate. No pains.

All operations were performed under chloroform narcosis.

Finally, I have coagulated a small cancer of the tongue superficially located on the right side of the tongue. Under local ring-anaesthetics coagulation was performed with bulb-electrode so that the coagulated surface measured  $1\frac{1}{2}$  cm. in diameter. The coagulated portion was not cut away but was left to loosen of itself. After 5 days a falling off of the coagulated portion had already begun with necrotic clots. After 9 days all the necroses had fallen away and the cavity of the wound was as big as the tip of a thumb. An inflammatory wall about 3 cm. thick round the wound cavity. After a further 2 days the whole of the wound cavity was healed with an inconsiderable infiltrate in the neighbourhood. No glands palpable.

## XXIV. E. Berven, Stockholm: Roentgen Treatment of Hidradenitis

Will be published in Acta Radiologica

## XXV. Åke Schéle, Lund: A Case of a Rare Skeleton Anomaly

I desire to demonstrate a case showing a rare skeleton anomaly which I came across by chance in the Roentgen Clinic in Lund.

On perusing the literature I could only find one similar case published, namely, by ALBERS-SCHÖNBERG, but it has since come to my knowledge that yet another case has been made public in the *Archiv d'électrologie*. I have, however, no had the opportunity of studying this.

ALBERS-SCHÖNBERG published his case in *Fortschritte auf dem Gebiete der Röntgenstrahlen* for the year 1915 under the heading: »Eine seltene bisher noch nicht bekannte Strukturanomali des Skelettes». I will herewith give a short abstract from it.



It dealt with a 23-year-old soldier, in civil life an »Emailenbrenner«, who came for examination on account of various pains in one of his shoulders and his foot, which troubles he had acquired during a couple of months' trying service in the trenches. The man was otherwise quite healthy. No signs of tuberculosis or lues and nothing of any interest in the anamnesis.

In all of the skeleton parts with exception of the skull, clavicle, scapula, spinal column and patella there appeared, almost exclusively in the spongy substance, a peculiar structure consisting of round or oblong, generally rather closely clustered dense spots, »ähnlich den bekannten Kompaktainseln«, giving the roentgen picture quite a speckled appearance. The spots were numerous in the metatarsal and metacarpal bones, and in the spongy substance of the metaphyses and epiphyses of the tubular bones, at places even in the corticalis, but without raising themselves anywhere above the surface. Several spots occurred in the upper and lower third-parts of the tibial diaphyses, but otherwise the diaphyses themselves were free. The acetabula of the hip-joints were surrounded by spots, which, however, only extended a little way into the os ilii and os ischii respectively; in the former only single spots along the outer margin were to be found. The size of the spots varied between 2 mm. and 5 cm. in length, and the higher they were located up in the metaphyses the larger and lengthier they were. In the small bones of the hands and feet, and especially in the heads of the metacarpal bones, the shape was chiefly round. All the spots were sharply defined. A few of them were not quite compact, but, as was the case in a thumb phalange, ring-shaped with lighter centres. The longitudinal axis of the spots invariably agreed with the longitudinal axis of the skeleton part in question, and in the short bones the structure of the bone shafts was generally followed fairly distinctly. The only other striking feature of the skeleton was a marked prominence of tuberculum min. on one humerus, almost reminding one of an exostosis.

I am now coming to my own case.

It concerns a 34-year-old medical student who was sent from the surgical outpatient department with a calcaneus fracture to be radiographed. The patient was otherwise quite healthy, big and strong. The anamnesis free from illnesses, nothing of hereditary interest either. The internal organs healthy. No evidences of tuberculosis or lues. The examination of the blood showed: Hg1b. 96, Red blood corpuscles 5,100,000. White blood corpuscles 8,400. Differential counts: Leucocytes 65 %, eosinophils 4 %, neutrophils 61 %, lymphocytes 26 %, basophils 2 %, mononuclears 7 %.

The systolic blood pressure measured 130 mm. Hg.

The only feature calling for remark was the rather high lymphocyte count and, taking the patient's age into consideration, the somewhat high blood pressure.

The plates which were taken of the calcaneus disclosed at once the peculiar structural conditions of the skeleton. Just as in ALBERS-SCHÖNBERG's case, also almost exclusively limited to the spongy bone parts, there were here found, more or less thickly scattered, round, oval, or more lengthy dense and homogeneous spots, generally sharply and distinctly defined, and of a size varying from 1 mm. to 4—5 cm. in the largest diameter, the smaller spots being confined to the small bones and the epiphyses, the larger ones to the metaphyses, and the higher up towards the diaphysis one came, the larger and longer they were. With one or two exceptions the diaphyses were free.

In my case the number of spots at the different places was still more numerous than in ALBERS-SCHÖNBERG's case and gave — as the annexed pictures show — a





Fig. 10.



Fig. 11.

peculiar appearance to the skeleton parts (see figs. 10, 11, 12, 13, 14, 15). In opposition to ALBERS-SCHÖNBERG I have in my case found spots in the clavicle and scapula as well as in the patella and spinal column. They were, however, less numerous in these bony parts. In the upper half of the patella especially there were but few visible. The lumbar vertebrae possibly showed a suggestion of spots, but only in the transverse processes, not in the vertebral bodies. It was quite the same in the sacrum where the spots were fairly numerous but were exclusively limited to the lateral parts. I shall not trouble to give a more detailed description, but will refer to ALBERS-SCHÖNBERG's paper. I will, however, add one or two further remarks. ALBERS-SCHÖNBERG points out how the arrangement of the spots distinctly follows the structure of the bone shafts. I agree with him, and this can



Fig. 12.



Fig. 13.

most distinctly be observed in the calcaneus and the neck of the femur. At the latter place the spots do not lie strictly axially as is the case with other metaphysal parts, but follow the shaft structure of the collum very distinctly. As far as the arrangement is otherwise concerned, the spots decidedly lie most thickly towards the joint-surfaces. In the calcaneus the central parts are relatively free. Even in my case there were spots to be found which had a less dense centre and a denser periphery, more or less presenting the picture of a ring. Similar spots might be seen in the bones of the fingers and here chiefly in the proximal parts of the basal phalanges. In the upper tibial metaphysis there were also several ring formations visible.

The spots were not absolutely confined to the epi- and metaphyses. In the upper part of the tibial diaphysis there were several lengthy dense streaks which, to be sure, were very diffusely distributed, but which are certainly of the same nature



Fig. 14.



Fig. 15.

as the other spots. In the lower third-part of of the fibular diaphysis there were three knob-shaped indentations of the corticalis in the medullary canal. The outlines of the outer corticalis were quite smooth. With these exceptions I have found the diaphyses free.

My little statement is only intended to demonstrate this rare case. To start speculating as to the nature and cause of the changes in the structure would simply be to plunge into the wide field of guessing. One can only agree with ALBERS-SCHÖNBERG when he says: »Die epiphysäre Lokalisation spricht, wie auch Grashey, mit dem ich über den Fall korrespondierte, meint, für einen Process der Wachstumsperiode. Es handelte sich wohl um eine belanglose Erscheinung die jedenfalls niemals klinische Bedeutung gewonnen zu haben scheint».

A definitive explanation is scarcely to be expected until the pathologist-histologist has been given the opportunity of expressing his opinion.

## XXVI. Åke Schële, Lund: An Apparatus for the Facilitation of Radium Treatment in the Mouth and Pharynx

I beg to be allowed to demonstrate an apparatus constructed by myself, and intended for use in the radium treatment of tumours of the cavity of the mouth (mainly tumours of the palate, palatine arches and tonsils) and of the throat (the pharynx as well as the epipharynx).

It is not long since the radium treatment of tumours in this site was considered nearly impossible. It was the difficulty of applying and fixing the radium satisfactorily during the necessary period of treatment that proved the stumbling-block.

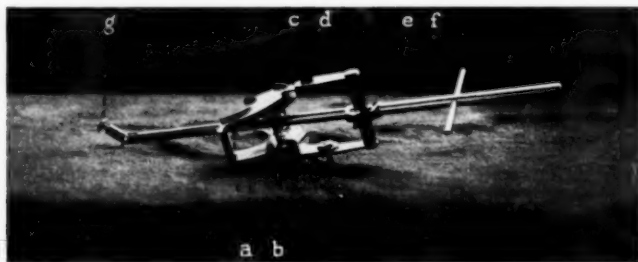


Fig. 16.

However, the technique has been more and more improved of late years, rendering the application of radium fairly satisfactory even on places difficult to get at. We mostly employ the technique perfected by EDLING<sup>1</sup> and BERVEN<sup>2</sup> with the use of a dental plastic compound as the main material in the construction of applicators for the purpose. The scissor-shaped instrument constructed by BERVEN<sup>2</sup> constitutes a considerable advance in the treatment of tumours of the soft palate, palatine arches, tonsils and certain parts of the throat.

In spite of their excellent merits these methods of procedure have their disadvantages as, firstly, they do not provide a reliable guarantee in respect to the radium really retaining an unchanged position during the necessary duration of treatment and, secondly, they do not always ensure the treatment being as endurable for the patient as one would desire. The big lumps of plastic substance in the mouth and between the teeth, often found necessary, and the pressure of BERVEN's forceps on the inner- and outer soft parts render the treatment in many cases difficult for the patient to bear and sometimes necessitate its being discontinued. In order to try to remedy these defects, I have constructed and had manufactured the apparatus I am now about to demonstrate.

The apparatus consists, firstly, of a principal part made of metal, and secondly, of a metal rod about 2 dcm. long attached to this and intended to support the

<sup>1</sup> EDLING: Studien über Applikationsmethoden in der Radiumtherapi, Lund 1918,

" : On Plastic Means of Application in Radium Therapy, Acta Radiologica, Stockholm, 1921.

<sup>2</sup> BERVEN: Erfarenheter om applikationstekniken vid radiumbehandling. Nord. Tidskr. for Terapi, 1917.

radium-containing applicator itself. The principal part consists in 2 arched metal splints, one for the teeth of the upper and one for the teeth of the lower jaw (see fig. 16), firmly fixed together at a distance from each other of about 1,5 cm. Between and fixed to the front parts of the splints there is a ball-joint (b) through which the rod mentioned runs, and from each splint emanates a short angular metal fastening (c) to which by means of an adjustable screw-joint (d) is fixed another splint of 1 or 2 cm. long. These two latter splints, the upper and lower, are connected with each other at their outer ends by means of a vertically placed rod movable round its axis (e) and to this the rod running through the ball-joint has another fastening (f) fixable in different positions. This contrivance permits the long rod to be moved within certain limits in the vertical as well as in the horizontal plane with the ball-joint as support, and, further, to be pushed in the direction of its own axis, and even to be removed from the apparatus. At the inner end of the rod there can be attached by means of a screw arrangement adaptable additional pieces suited for application in different regions and consisting of metal rods of different length (fig. 17), furnished with a screw (g) for the fixation of a lead plate cut according to the extent of the area to be treated. These lead plates may be, at the same time, considered as ray-protectors. Through the outer end of the long rod an easily detachable shorter rod is transversally introduced, in order to steady the grip of the hand during the introduction and fixation of the applicator.



Fig. 17.

The method of procedure will thus be as follows:

According to the area to be treated, the one or other of the accessory pieces is employed, furnished with a lead plate, the thickness of which can amount to 4—5 mm. If a stronger protection is desired, a further lead plate can be attached to the former by means of the paste. On this protector which, according to circumstances, is made flat, cupular or groove-shaped the radium tubes with primary filters are attached, and around the whole in desired position a layer of compound, serving as secondary filter, all adapted to demands made by local conditions (e. g. as in fig. 2). Through the mobility of the accessory pieces the radium applicator can be placed and fixed in the manner found most suitable, in doing which the definitive position of the long fixation rod must be calculated to lie in the medial line between the teeth. The rod is then introduced in the fixation apparatus, the radium applicator is placed against the area of the tumour (eventually after cocaineisation) and finally the apparatus is introduced between the teeth after a layer of the paste has been spread on each of the arched splints. The patient himself then fixes the whole by biting his teeth together, the rod is fixed in the desired position, the paste on the splints is cooled off and the application is ready. The jaws are further fixed by means of a firmly applied bandage under the chin and up over the crown of the head.

The rather great space between the two metal splints permits a good view of the cavity of the mouth and in the majority of cases, when so demanded, a repeated control of the position of the radium. If necessary, the inspection may be facilitated by introducing a narrow tongue spatula.

The apparatus has quite recently been manufactured and I have only had the opportunity of testing it in one or two cases. However, on these occasions it has functioned quite satisfactorily and I trust it will aid in filling out the still rather big gap in the technical field of radium treatment.

During the last autumn we have had the opportunity of testing the apparatus in several cases and on these occasions it has also functioned quite satisfactorily.

The apparatus is manufactured by ALFRED N. HILL, instrument maker, Lund.

### Discussion:

1. E. BERVEN, Stockholm: The arrangement for the application of radium in the pharynx, which I published in 1917, in »Nordisk Tidsskrift för Terapi», has several disadvantages, as Dr. Schéle has pointed out.

The greatest disadvantage of these forceps — a disadvantage which is also attached to Dr. Schéle's model — is the straight rod which supports the applicator. It inconveniences the patient rather much as it is placed right in the middle of the mouth, thereby impeding the movements of the tongue.

I have therefore constructed a new model, which is in course of manufacture, in which this rod slides in along the inner side of the teeth and afterwards with a bend angularly passing the tonsillar region into the pharynx.

On another model, which I am going to try, the rod runs right into the vestibulum oris, turning in through the retro-dental chamber.

I have found no reason for abandoning the construction with a pelotte on the outer side of the cheek, as it does not inconvenience the patient and gives a very sure fixation.

Generally speaking, I have found that the most important factor in the application of radium in the pharynx is to achieve a firm and steady fixation. As soon as an applicator rests steadily, and is not displaced by the action of swallowing, the troublesome nausea and irritation cease.

One great disadvantage of Schéle's forceps must undoubtedly be the large number of screw-joints and the trouble of keeping these clean.

2. Å. SCHÉLE, Lund: With respect to any difficulty in swallowing, I have not yet found that the passage of the rod in the middle of the cavity of the mouth above the tongue has occasioned this.

On those occasions when difficulty has arisen the cause has rather been the position of the radium applicator itself against the palate or throat.

## XXVII. Lars Edling, Lund: A Device for providing Protection against Light at the Entrance to the Dark Room at the Roentgen Institute

Published in Acta Radiologica. Vol. I. fasc. 3. p. 375.



## Stadgar för Nordisk förening för medicinsk radiologi

antagna vid möte i Kristiania den 2 juli 1919 och i Köpenhamn den 25 sept. 1921

### § 1.

Föreningen har till ändamål att verka för den medicinska radiologiens utveckling, framför allt genom att anordna möten mellan Nordens radiologer med föredrag, diskussioner och demonstrationer i radiologiska ämnen.

### § 2.

Till medlemmar av föreningen kunna väljas läkare, ingenjörer och vetenskapsmän i övrigt från Danmark-Island, Finland, Norge och Sverige, vilka arbeta med eller intressera sig för den medicinska radiologien.

### § 3.

Till hedersmedlemmar av föreningen kunna kallas personer inom eller utom Skandinavien och Finland, vilka föreningen önskar giva sitt erkännande för utmärkta förtjänster om radiologien.

Till korresponderande medlemmar av föreningen kunna väljas framstående utländska radiologer, vilka föreningen önskar innesluta i sin krets.

### § 4.

Styrelsen äger att besluta om antagande av medlemmar. Förslag till inval skall ske genom skriftlig anmälan till föreningens styrelse av två av föreningens medlemmar. Medlem av en radiologisk förening i de land, som föreningen omfattar, kan dock bliva medlem endast genom skriftlig anhållan härom till styrelsen.

Kallelse till hedersmedlem och val av korresponderande medlem beslutes av föreningen på förslag av styrelsen.

### § 5.

Medlem av föreningen betalar i årsavgift 20 kr. Medlem, som trots påminnelse av skattmästaren icke betalat årsavgiften, anses ha utträtt ur föreningen, men har dock rättighet att, mot betalning av årsavgiften, ånyo inträda som medlem av föreningen.

Hedersmedlemmar och korresponderande medlemmar äro befriade från avgift till föreningen.

### § 6.

Föreningens styrelse består av 9 medlemmar med 5 suppleanter, som väljas för en tid av 2 år och som kunna omväljas.

## § 7.

För varje land, som är representerat i föreningen, väljas 2 styrelsemedlemmar och en suppleant, med undantag för det land där nästa möte skall äga rum. Detta land väljer 3 medlemmar i styrelsen samt 2 suppleanter.

## § 8.

Föreningen väljer ordföranden, som skall tillhöra det land där nästa möte skall äga rum.

## § 9.

Styrelse väljer inom sig vice ordförande, sekreterare och skattmästare.

## § 10.

Styrelsen håller ordinarie sammanträden dagen före föreningens möte.

Extra styrelsesammanträde äger rum, när ordföranden anser det nödvändigt; likaså när minst 4 av styrelsens övriga medlemmar skriftligen gjort anhållan därom till ordföranden. Kallelse till styrelsesammanträde ombesörjes av ordföranden och skall vara utsänd minst 14 dagar före mötet.

Styrelsens beslut kan fattas per capsulam.

Styrelsen är beslutsmässig, när minst 5 av dess medlemmar deltaga i omröstningen. Vid lika röstetal äger ordföranden utslagsröst.

## § 11.

Styrelsen väljer inom sig ett arbetsutskott bestående av ordföranden, sekreteraren och skattmästaren.

Arbetsutskottet åligger:

1. att ombesörja föreningens löpande ärenden,
2. att förbereda viktigare frågor, innan dessa avgöras av styrelsen,
3. att förbereda föreningens möten i överensstämmelse med det av styrelsen fastställda programmet,
4. att besluta angående de nödvändiga, löpande utgifterna.

## § 12.

Styrelsen skall på föreningens möte avge en kort redogörelse för föregående möte och för föreningens räkenskaper. Den vid mötet fungerande sekreteraren ombesörjer publicerandet av föreningens vetenskapliga förhandlingar.

## § 13.

Föreningen håller, om möjligt, möte varannat år i det land, som bestämmes på föregående möte, samt på tid och ställe, som styrelsen beslutat senast ett år förut och meddelat samtliga föreningens medlemmar.

## § 14.

Styrelsen utarbetar för varje möte ett program, varvid iakttages följande: Diskussionsämnen, som äro bestämda på föregående möte, skola uppföras i första rummet på programmet. Övriga diskussionsämnen bestämmas av styrelsen, som också sörjer för inledare till alla diskussioner. Diskussionsämnen såväl som inledare skola vara bestämda minst ett år före mötet, och meddelande därom äga rum till samtliga föreningsmedlemmar.

Styrelsen åligger att ombesörja att inledningsföredragen äro tryckta och utdelade



minst en månad före mötet. Vid detta må blott givas en kort resumé av inledningsföredragen. Mötesavgifterna bestämmas av styrelsen.

§ 15.

Vid föreningens sammankomster har varje medlem en röst.

Röst får icke överlätas, ej heller får medlem rösta med fullmakt.

Val äga rum genom öppen omröstning, då ej annat begäres. Ordföranden väljes först, därefter väljas de övriga styrelsemedlemmarna och suppleanterna gruppvis för varje land.

Vid lika röstetal avgöres val genom lottning; i andra frågor gäller i sådant fall den mening som biträdes av ordföranden.

§ 16.

Tillträde till mötenas vetenskapliga förhandlingar kan av ordförande medgivas icke medlemmar mot erläggande av mötesavgiften.

§ 17.

Förslag om förändring av dessa stadgar, framställt av en medlem, skall insändas skriftligen en månad före föreningens möte till styrelsen, som äger att avge yttrande härom till föreningen.

Förslag om förändring av stadgarna, framställt av styrelsen, skall framläggas skriftligen på föreningens möte.

Beslut om ändring av stadgarna fordrar bifall av minst  $\frac{2}{3}$  av de avgivna rösterna för att anses giltigt.

## Styrelsen för Nordisk förening för medicinsk radiologi 1922—1923

- |   |   |
|---|---|
| Forssell, Gösta, M. D., Professor, <i>Ord-<br/>förande</i> . Stockholm. | Edling, Lars, M. D., Docent, <i>Suppleant</i> .<br>Lund.            |
| Larsén, Teodor, M. L., <i>Sekreterare</i> . Stock-<br>holm.             | Heyerdahl, S. A., M. D., Docent. Kristiania.                        |
| Heyman, James, M. D., Docent, <i>Kassa-<br/>förvaltare</i> . Stockholm. | Hornborg, A., M. D., Överläkare, <i>Suppleant</i> .<br>Helsingfors. |
| Berle, E., Dr. Kristiania.  | Panner, H. J., Dr, Överläkare. Köbenhavn.                           |
| Baastруп, J. C., Dr, <i>Suppleant</i> . Köben-<br>havn.                 | Reyn, Axel, M. D., Överläkare. Köben-<br>havn.                      |
| Boije, O. A., M. D., Docent. Helsingfors.                               | Thue, Hans, Dr, <i>Suppleant</i> . Kristiania.                      |
|   | Wetterstrand, G. A., Dr. Helsingfors.                               |

## Hedersledamöter i Nordisk förening för medicinsk radiologi

- |   |   |
|---|---|
| M. le Dr A. Bécélère. Paris.                                    | Dr Holzknacht, Guido, Professor. Wien.                        |
| John Berg, M. D., Professor. Stockholm.                         | Dr Kienböck, Robert, Professor. Wien.                         |
| M. le Professeur J. Bergonié. Bordeaux.                         | E. G. Phaler, M. D., Philadelphia, Penns.                     |
| R. D. Carman, M. D. Rochester, Minn.                            | U. S. A.  |
| U. S. A.  | Dr Rieder, Hermann, Professor. München.                       |
| James T. Case, M. D. Battle Creek, Mich.                        | Sidney Russ, D. Sc., Professor. London.                       |
| U. S. A.  | Ernest Rutherford D. Sc., F. R. S. Pro-<br>fessor. Cambridge. |
| William David Coolidge, Ph. D. Schen-<br>ectady, N. Y. U. S. A. | Dr von Röntgen, W. C. Geh. Rat, Pro-<br>fessor. München.      |
| Mme le Professeur Marie Curie. Paris.                           | Tage Sjögren, M. D. Stockholm.                                |
| J. F. Fischer, M. D., Professor †. Köben-<br>havn.              | Lars Vegard, Ph. D., Professor. Kristiania.                   |
| Dr Grashey, Rudolph, Professor. München.                        |   |

## Medlemsliste for Dansk radiologisk Selskab April 1922

- |   |   |
|---|---|
| Reyn, A., Overlæge, <i>Formand</i> St. Kongens<br>gade 128. København.  | Maag, A., Doktor. Odense.                                       |
| Wolff, Aage O., Doktor <i>Sekretær</i> Classens-<br>gade 25. København. | Möller, P. Flemming, Doktor, Vesterbro-<br>gade 140. København. |
| Baastrup, J. C., Doktor, St. Kongens gade<br>68. København.             | Nordentoft, S., Overlæge, Vester Voldgade<br>96. København.     |
| Chievitz, Ole, Overlæge, Dr., Nørrebro-<br>gade 11. København.          | Panner, H. J., Doktor, H. C. Ørstedesvej 70.<br>København.      |
| Collin, Edv., Doktor, Gardes Allé 23.<br>København.                     | Rames, O., Doktor. Aarhus.                                      |
| Hansen, A., Doktor. Kolding.  | Riis, A., Doktor. Aarhus.                                       |
| Henriksen, L., Doktor, Værnedamsvej 11.<br>København.                   | Scheuermann, H., Doktor, Amaliegade 43.<br>København.           |
| Honoré, P., Doktor, Rosengaarden. 12.<br>København.                     | Sonne, C., Doktor, N. Frihavsgade 86.<br>København.             |
| Kellermann, A., Doktor, Smallegade 26 a<br>København.                   | Stockfleth, V., Doktor, Martinsvej. Køben-<br>havn.             |
| Kühl. Joh., Ingeniør, Tagensvej 1a. Køben-<br>havn.                     | Toxvord, Ingeniør, Nicolajplads 38. Køben-<br>havn.             |
| Larsen, Holger, Ingeniør, Gl. Kongevej<br>140. København.               | Wegge, K., Doktor, Strandvej 45. Taar-<br>bæk.                  |
| Lassen, K. C., Ingeniør, Ingerslevsgade<br>136. København.              | Wissing, O., Doktor, Bredgade 43. Køben-<br>havn.               |
| Lau, Doktor. Faxe.  | With, C., Doktor, Frederiksborgsgade 25.<br>København.          |
| Lunn, Knud., Overlæge. Haderslev.                                       | Voss, C., Ingeniør, Nicolajplads 34. Køben-<br>havn.            |

## Medlemmar i Finska föreningen för medicinsk radiologi April 1922

- |   |   |
|---|---|
| Wetterstrand, G. A., Doktor, <i>Ordförande</i> .<br>Skillnadsgatan 3. Helsingfors.    | Hornborg, A. F., Doktor, Artillerigatan 23.<br>Helsingfors. |
| Boije, O. A., Professor, <i>Sekreterare</i> . Boule-<br>vardsgatan 22 a. Helsingfors. | Jansson, C. Gösta, Doktor. Georgsgatan 2.<br>Helsingfors.   |
| Emeleus, R., Doktor. Tammerfors.  | Lindström, L., Doktor. Wasa,                                |
|   | Öhman, Runar, Doktor. Jakobstad.                            |

## Fortegnelse over medlemmer av Norsk Forening for medicinsk radiologi April 1922

- |   |   |
|---|---|
| Heyerdahl, S. A., Overlæge, M. D., <i>Formand</i> . Rikshospitalet. Kristiania. | Gleditsch, Ellen, Ph. Doktor. Kristiania.           |
| Berle, E., Doktor, <i>Viceformand</i> . Kristiania.                             | Gundersen, E., Doktor. Kristiansand.                |
| Schiander, A. W., <i>Sekretær</i> . Kristiania.                                 | Huitfeldt, H., Doktor. Kristiania.                  |
| Amundsen, P., Doktor. Chr. Augustgate 23. Kristiania.                           | Klason, T., Doktor. Bergen.                         |
| Backe, Sigv., Doktor, Akers Sykehus. Aker.                                      | Meyer, Carl, Doktor. Bergens sykehus. Bergen.       |
| Barth, J. M., Doktor, Kristiania.   | Nitter, H., Doktor, Bratsbergs amts sykehus. Skien. |
| Brodersen, H. J., Doktor. Drammen.  | Sverre, Ingemann, Doktor. Kristiania.               |
| Bülöw-Hansen, V., Doktor. Kristiania.   | Thue, H., Doktor. Kristiania.                       |
| Furuheim, Ingeniør. Kristiania.   | Vegard, L., Professor, Ph. D. Kristiania.           |
| Giertsen, P. E., Doktor. Kristiania.  |   |

## Medlemmar i Svenska föreningen för medicinsk radiologi April 1922

- |   |  |
|---|--|
| Forssell, Gösta, M. Dr, Professor, <i>Ordförande</i> , Bergsgatan 2. Stockholm. | Edling, Lars, M. Dr, Docent. Lasarettet. Lund.               |
| Berven, Elis, Doktor, <i>Sekreterare</i> , Fjällgatan 23. Stockholm.            | Fürst, Carl, Doktor. Målilla Sanatorium. Målilla.            |
| Heyman, James, Docent, <i>Kassaförvaltare</i> , Östermalmsgatan 43. Stockholm.  | Haglund, Patrik, M. Dr, Professor. Sturegatan 62. Stockholm. |
| Almblad, J., Doktor. Mönsterås.   | Hansson, Nils, Doktor. Sveavägen 76. Stockholm.              |
| Asplund, Gustaf, Doktor, Nybrogatan 28 B. Stockholm.                            | Hasselroth, Sten, Doktor. Sankt Eriksgatan 13. Stockholm.    |
| Aurén, T., Fil. Dr, Lektor. Upplandsgatan 18. Stockholm.                        | Helmer, Hans, Doktor. Lund.                                  |
| Bagge, Ivar, Doktor. Vasagatan 35. Göteborg.                                    | Heiman, G. D., Doktor. Kungssportsplatsen 2. Göteborg.       |
| von Bergen, Fredrik, Doktor, Överläkare. Sahlgrenska sjukhuset. Göteborg.       | Jacobæus, H. C., M. Dr, Professor. Nybrogatan 6. Stockholm.  |
| Bohm, Werner, Doktor. Lasarettet. Linköping.                                    | Johansson, Sven, Doktor. Vasagatan 35. Göteborg.             |
| Carlsten, Dag, M. Dr. Allmänna sjukhuset. Malmö.                                | Järnh, Bror E., Ingeniør. Klarabergsgatan 56. Stockholm.     |
| Carlström, Claes, Doktor. Viktoriagatan 11. Göteborg.                           | Karsten, A., Doktor. Kungsgatan 60. Stockholm.               |
| Edberg, Einar, Doktor. Handverkaregatan 4. Stockholm.                           | Key, Einar, M. Dr, Docent, Riddaregatan 1. Stockholm.        |

- Larsén, T., Doktor. Serafimerlasarettets röntgeninstitut, Stockholm.
- Laurell, Hugo, Doktor. Akademiska sjukhuset. Uppsala.
- Lindhagen, E. Doktor. Kungsgatan 54. Stockholm.
- Lundgren, Gunnar, Doktor. Serafimerlasarettet. Stockholm.
- Lundquist, Birger, M. Dr. Drottningsholmsvägen 4 C. Stockholm.
- Lysholm, Erik, Doktor. Fjällgatan 23. Stockholm.
- Moberg, Ludvig, M. Dr, Docent. Humlegårdsgatan 13. Stockholm.
- Morsing, W., Doktor. Boden.
- Odelberg-Jonsson, Doktor. Sabbatsbergs sjukhus. Stockholm.
- Odencrantz, Arvid, Fil. Dr, Docent. Floragatan 13. Stockholm.
- Odqvist, Henning, Doktor. Akademiska sjukhuset. Uppsala.
- Ramstedt, Eva, Fil. Dr, Docent. Luntmakaregatan 78. Stockholm.
- Runström, Gösta, Doktor. Markvardsgatan 16. Stockholm.
- Saul, Eugen, Doktor. Falun.
- Sievert, R., Fil. Kand. Bragevägen 5—7. Stockholm.
- Schaumann, Jörgen, M. Dr, Docent. Kungsgatan 19. Stockholm.
- Schele, Åke, Doktor. Lasarettet. Lund.
- Scholander, Axel, Doktor. Lasarettet. Hälsingborg.
- Simon, Moritz, M. Dr., Överläkare. Drottninggatan 71 A. Stockholm.
- Sjögren, Tage, M. Dr. Sturegatan 8. Stockholm.
- Ström, Sigfrid, Doktor. Överläkare. Lasarettet. Umeå.
- Wahlgren, Sven, Doktor. Lasarettet. Lund.
- Waldenström, Henning, M. Dr. Docent. Kommendörsgatan 3. Stockholm.
- Westermark, Nils, Doktor. Fjällgatan 23. Stockholm.
- Westman, Axel, Doktor. Hantverkaregatan 23. Stockholm.
- Winther, Einar, Doktor. Lasarettet. Lund.
- Åkerlund, Åke, M. Dr. Överläkare. Kungsholms hamnplan 3. Stockholm.

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1. *Varje lokalredaktion bestämmer beträffande antagandet av arbeten från det egna landet samt ombesörjer språkgranskning och korrekturläsning för dessa arbeten.*

2. *Arbeten från Danmark, Finland och Norge insändas först till redaktionen i respektive författares hemland och genom denna till utgivare. Svenska arbeten insändas direkt till utgivaren.*

3. *Artiklarna i Acta tryckas på engelska, franska eller tyska språken efter författarens val.*

4. *Synnerligen förtjänstfulla originalarbeten från länder, som icke deltaga i utgivandet av Acta, kunna efter särskilt beslut av redaktionen antagas till publikation i Acta. Deras publikation ombesörjes av utgivaren.*

5. *Till publikation i Acta antagas icke utom efter särskilt beslut av lokalredaktionen uppsatser av större omfång än 32 trycksidor. Arbeten av större omfång än 64 trycksidor intagas icke i tidskriften.*

6. *Arbeten av större omfång kunna däremot utgivas som supplementband till Acta enligt därom särskilt fastställda bestämmelser.*

7. *Redaktionerna äga rätt att bestämma antalet planscher, som kunna mottagas för varje avhandling. Önskar förf. flera planscher än redaktionen anser sig kunna bevilja, sker tryckningen av de överstigande planchererna på förf:s bekostnad.*

8. *Varje artikel skall förses med en resumé, som visserligen bör vara kortfattad, men dock tillräckligt fullständig och avfattad i sådan form, att den kan användas såsom auto-referat av arbetet.*

9. *Manuskripten skola inlämnas översatta och maskinskrivna till redaktionen. Översättning av manuskript kan dock ombesörjas av redaktionen, men kostnaderna för översättningen och maskinskrivningen skola i så fall bestridas av förf.*

10. *Korrektur sändes, jämte manuskript, från utgivaren direkt till förf., som återsänder manuskriptet till sitt eget lands redaktion för vidare befordran till utgivaren efter vederbörlig granskning.*

11. *Om korrigeringskostnaden för ett korrektur överstiger 10 % av sättningskostnaden, debiteras förf. för den överstigande kostnaden.*

12. *För separattruck av artiklar i Acta betalar förf. kostnaden.*

13. *Redaktionen för varje land bekostar själv översättning, språkgranskning, sättning, tryckning, korrekturläsning och planschtryck för dess bidrag till Acta samt den lokala redaktionens expeditiionskostnader.*

14. *Kostnaderna för det gemensamma redaktions- och expeditiionsarbetet ersättas lika av alla i Acta deltagande länder, likaså kostnaderna för publikation av arbeten från andra än de i Acta deltagande länderna.*

## Önskemål beträffande manuskriptens beskaffenhet

1. Arbetena skola insändas till redaktionen *maskinskrivna*.

2. Om *översättningen* verkställs före arbetets insändande till redaktionen, är önskligt, att språket granskas av fullt kompetent person.

3. För att giva tidskriften en enhetlig utstyrsel och undelätta *angivandet av stilar och markeringar i texten*, har redaktionen låtit utföra en anvisning angående de i Acta använda *tryckstilarna* och deras lämpliga markering i manuskriptet.

4. *Författares namn* i texten, liksom i litteraturförteckningar, böra angivas *ej blott med tillnamn* utan även med *förnamn* eller *initialerna* av förnamnen.

Vid *litteraturcitat* böra så *noggranna uppgifter* som möjligt lämnas om den citerade publikationen. *Litteraturförteckningar* helst *efter* texten.

5. *Det maskinskrivna manuskriptet* bör betraktas som ett första korrektur och ytterst noga rättas. Redan i manuskriptet böra alla *figurhänvisningar* och *litteraturhänvisningar* tydligt och fullständigt införas, liksom alla *markeringar i texten* redan i manuskriptet böra noggrant utföras. Varje tillägg, ändring eller borttagande av ord i det tryckta manuskriptet medför stora rättningskostnader, som återfalla på författaren.

6. *Texten* bör *ej onödigtvis söndersplütras* i korta stycken. Detta ökar oskäligt sättnings- och papperskostnaderna.

7. *Bilder* som skola införas i texten, *kurvor, tabeller* och dylikt *insändas för sig, jämte* manuskriptet och *inklistras ej* i detta. I manuskriptet angives synnerligen noga *bildernas plats* och meddelas den *text, som hör till bilderna*. Det vållar stora kostnader att ombryta korrekturet för att i detsamma infoga bilder eller text till bilden.

8. För *reproduktion av röntgenbilder* insändas lämpligen antingen *själva röntgen-negativen* eller *förminskade negativa plåtar*, eller verkligen *kontrastrika* och detaljrika *papperskopior*.

Större plåtar än 18×24 cm. böra helst förminskas till formatet 13×18 cm. före försändningen, enär större plåtar gärna bliva sönderslagna under transporten. Plåtarna böra förpackas väl, med mjukt mellanlägg omkring varje plåt, i stadiga trälådor.

9. Vid bedömandet av *reproduktionens storlek*, bör man vid röntgenbilder beakta, att det gäller som princip, att *icke taga med mera av röntgenbilden än som för orientering å plåten är absolut nödvändigt*, men utföra reproduktionen i tillräcklig storlek för att detaljerna skola framträda. *Reproduktionsskalan* bör angivas i figurförklaringen.

10. Det är att märka, att *priset för tillverkande av klichéer är detsamma för utförande från minsta storlek upp till 50 kvadratcentimeter*, så att det icke av ekonomiska skäl är indicerat att göra dem mindre än 50 cm<sup>2</sup>.

11. På *varje plansch* i Acta rymmes en *tryckyta av 15×20 cm. storlek* eller 4 klichéer av 7×9 cm. storlek eller 2 klichéer av 15×9 cm. storlek. Vid reproduktion av *benförändringar* är det i regel fördelaktigast att använda en *negativ bild* på klichéen.

Det är fördelaktigast att använda ett relativt fint raster vid utförande av autotypier av röntgenbilder.

Redaktionen



## Uppgift angående tryckstilar i Acta Radiologica

Markeras i  
manuskrip-  
tets margi-  
nal med

|  |   |        |
|--|---|--------|
| Auf dem Schnitt Muskula,   | för huvudrubriker   | stil 1 |
| Auf dem Schnitt Muskulatur,  | för underrubriker   | stil 2 |
| Auf dem Schnitt Muskulatur, Nerven,  | för mindre underrubriker  | stil 3 |
| Auf dem Schnitt Muskulatur, Nerven,<br>Artären und Venen. Hyperplasie der<br>Intima der sämtlichen grossen und mit-<br>telgrossen Artären. In den mittelgrossen  | stil till texten  | Korpus |
| Auf dem Schnitt Muskulatur, Nerven, Artären<br>und Venen. Hyperplasie der Intima der sämt-<br>lichen grossen och mittelgrossen Artären. In<br>den mittelgrossen Artären ist die Hyperplasie                          | stil till sjukhistorier och<br>refererande delar av<br>texten                       | Borgis |
| Auf dem Schnitt Muskulatur, Nerven, Artären och<br>Venen. Hyperplasie der Intima der sämtlichen gros-<br>sen och mittelgrossen Artären. In den mittelgrossen<br>Artären ist die Hyperplasie von konzentrischem Typus | stil <i>endast</i> till <i>footnoter</i> under<br>texten och figurförkla-<br>ringar | Petit  |
| <i>Auf dem Schnitt Muskulatur, Nerven,</i>   | kursiv stil till markering i<br>texten av <i>längre me-<br/>ningar</i>              | _____  |
| Auf dem Schnitt Muskulatur, Nerven,  | spärrad stil till markering<br>i texten av <i>enstaka ord</i>                       | - - -  |
| BECK, PFAHLER, CASE, CARMAN, ASSM.   | kapitälstil till <i>författar-<br/>namn</i> i texten                                | =====  |

*Var god angiv redan i manuskriptet tydligt och fullständigt önskade  
markeringar i texten!*

Redaktionen

